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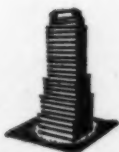
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WE can be prosperous beyond our dreams—all of us—workers, farmers, and business men—but one of the prerequisites is the self-discipline of accepting competition for ourselves as well as others.

* * *

Free enterprise does not imply the freedom to use any or all means to make a profit. It does not mean the right to monopolize. *It means the opportunity and obligation to compete.*

Competition requires *independence of action, free access to the market, and no large degree of control over the price* by any buyer or seller. In general, the larger the number of sellers and the more easily buyers can shift from one seller to another, the higher will be the degree of competition (and vice versa for buyers).

But let us not get too academic or go off the deep end. We cannot have perfect competition. We cannot subdivide businesses and labor unions into tiny units to make a multitude of buyers and sellers in each market; we cannot reduce our rich variety of products to a few rigidly standardized items; we cannot educate people to judge quality precisely; we cannot eliminate the costs of bridging space between buyers and sellers. On the other hand, have we gone as far as is practical and desirable in these directions?

We cannot even have a system of highly "sensitive" prices, that is, prices which fluctuate immediately in response to every minor change in demand and supply. This would occur in the dream world of competition-to-the-nth-degree. It cannot occur in the real world, or even in the ideal world of competition best suited to physical facts and human qualities. The economies of large-scale enterprise, the need for adapting products to human wants, the costs of transportation and the costs of issuing and acquiring market information put severe limits on price sensitivity.

Economists tell us that if prices were extremely sensitive, business booms and depressions would be much less severe—provided our stock of money remained fairly constant. But with the somewhat limited degree of sensitivity which is practicable in the economy, price and wage changes cannot prevent severe declines in

business activity. *We cannot count on competition alone to cure depressions.* We must look mainly to other kinds of measures to prevent mass unemployment of men and machines.

If we cannot have prices which fluctuate with every small change in demand and supply conditions, we can work toward—and achieve, if we really want it—a system in which prices and wages are at least roughly responsive to long-run changes in demand and supply, a system in which most markets are not dominated by individual businesses, groups of businesses, labor unions, or farm organizations, and in which prices and wages are maintained at levels consistent with free access to markets and to jobs.

In any kind of an economic system there must be some means of determining prices, wages, and profits, and of bringing labor and capital into employment in the industry and place where they are most needed. There are two ways to do this: by administrative fiat or by the impersonal processes of the market. The first of these is typical of the totalitarian state; it frequently involves destruction of individual freedom or fumbling mismanagement. During the war all of us have had some experience with patronizing and paternalistic treatment by the state; we have found out what it means to be pushed around by bureaucrats; and we have discovered that the political determination of prices, wages, and profits leads to chaos when self-interest supersedes the fine fever of patriotism—as it eventually does. I do not mean to imply that we can do without controls over prices, production, and distribution in time of war; but I do suggest that we can learn something from their operation. Even with a united national purpose these controls work badly when human abilities are inadequate for the superhuman task, when personal or departmental jealousies crop up among officials, and when pressure groups try to prey on the rest of the public. Every day more Americans are beginning to understand why our forefathers feared the caprice and tyranny of power.

The impersonal processes of the market in determining prices and wages and in allocating productive resources will, in normal times, save us from the fumbling of bureaucrats and from the Babel of confusion, un-

certainty, and annoyance produced by their regulations. But these market processes will not save us from paying toll to those who monopolize and restrict entry to markets or jobs.

If we want an economy in which we are free to try out new ideas, develop new products, and introduce more efficient methods of production, if we want an economy in which there are great opportunities for men of imagination, inventiveness and energy, if we want an economy wide open to progress, then we must have a free field and fair competition for all comers—without collusion as to prices, markets, or production. This is the only basis on which we have a right to demand freedom from governmental regulation for ourselves and on which we can combat monopolistic tendencies in other quarters.

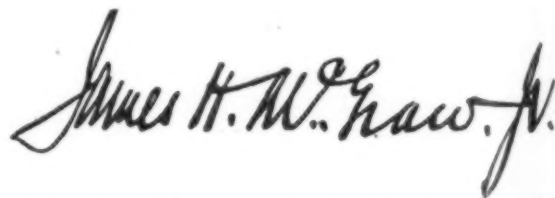
Let us stand squarely for the principles of the anti-trust laws and against all collusion and combination in restraint of trade. Let us insist that the government review with a critical eye every combination and consolidation which might restrict competition. Let us face frankly the problems of economic power arising out of price leadership and encourage every honest effort to find means to deal with them. Let us not shrink from questions as to whether some great aggregations of plants are too large for efficiency, free entry into the industry, and a free price. While we resist the efforts of the Department of Justice to extend the anti-trust laws by far-fetched and distorted interpretation, and while we fight every attempt to use them as a tool of persecution, let us cooperate in sincere efforts to modernize these laws and extend them by specific legislation to monopolistic practices they cannot now reach. I do not have a simple formula for this, but I believe we must try to find one.

We can then, better face the problem of the growing monopoly in labor which is threatening to make the free enterprise system unworkable. Today labor is going through a stage of empire building reminiscent in some ways of a similar stage in business three-quarters of a century ago. Witness the same buccaneering spirit, the same concentration on selfish interests, and the same disregard for the public welfare. Business leaders learned the hard way that the public will eventually rise up against those who prey upon them. Will our labor leaders be wiser? The right to collective bargaining to protect the weak position of the individual employee is one thing—but the grant of unlimited monopoly privilege to combine into a private government which can dictate its own terms to businesses, industries, communities, and even to the government itself, and which can start a wage-price spiral such as to hinder the war

effort and make full prosperity impossible in time of peace is something quite different. We need to find a middle way which will prevent employers from exploiting employees but which does not sow the dragon's teeth. The exercise of arbitrary power by labor threatens not only business, but also all workers outside the unions and all those dependent on pensions and savings for their existence, and ultimately, of course, the well being of union workers themselves.

The idea that the labor problem can be solved if great, powerful organizations of employers will sit down with great, powerful organizations of labor is a delusion. If our experience in the N.R.A. and in the war teaches us anything, it is that the best that can be expected in the long run from such a situation is an armed truce with intermittent civil war. And every truce would be a monopolistic arrangement to take advantage of those not members of the great organized groups. Business and labor unions, whenever confronted with postwar readjustments that are unfavorable to them will be sorely tempted to protect their own special interests at the expense of the public. There will be efforts on the part of businesses, abetted by labor unions, to limit productive capacity, to raise tariffs, to obtain subsidies, and to maintain prices at artificially high levels. The unions will oppose labor saving changes and will seek higher wages even in areas and industries of surplus labor. Already demands are emerging for direct joint action by business, labor, and agriculture to solve the transition problems of special concern to them. While these groups should have every opportunity to register their own self-interest, we cannot entrust our fate to decisions made by pressure groups. If experience is any guide, such coalitions will be almost certain to restrict opportunities for progress and expansion, to exploit the public, and ultimately to injure even the businesses, workers, and farmers included in them. We cannot afford a postwar N.R.A. Resort to temporary government regulation in the transition from war to peace may, however, be necessary in cases of great hardship.

We can be prosperous beyond our dreams—all of us—workers, farmers, and business men—but one of the prerequisites is the self-discipline of accepting competition for ourselves as well as others.



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CHEMICAL & METALLURGICAL ENGINEERING

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DECEMBER, 1943

S. D. KIRKPATRICK, Editor

UNITY NOW?

PERIODICALLY the engineering profession suffers from an inferiority complex. Sometimes it gets the notion that it isn't a profession at all! It feels it lacks solidarity, coordination and leadership. It finds itself unable to speak and act with any singleness of purpose or direction. It looks with envy at the apparently smoothly running operations of the American Medical Association, the Bar Association, and even the American Chemical Society. Then it wonders if perhaps what is needed most is not some super-organization to take care of all the engineers and all their problems—technological, professional, economic, political, and social.

Right now we are in the midst of such a discussion and before we close our minds entirely to the possibility of doing something about it, we may well consider some of the problems we are up against and what existing machinery we have for their solution. President Harold V. Coes of A.S.M.E. returned from a visit to that society's widely scattered local sections and reported, in the October *Mechanical Engineering*, that he found almost universal interest in the problem of coordinating the engineering profession. Contrary to some of our impressions, he reported that more interest was evinced by younger than by older members. They "think that as a result of the lack of unified front the engineering profession suffers in prestige and in broad usefulness." So that something may be done about it, Mr. Coes as Chairman of the Joint Conference Committee of the Presidents and Secretaries of the A.S.C.E., A.I.E.E., A.S.M.E., A.I.M.E. and A.I.Ch.E., has appointed a Committee "to outline and define the problem and to plan, in true engineering fashion, the approach to its solution."

Secretary Arthur B. Parsons of the A.I.M.E. has tackled the problem in a thought-provoking article in the September number of *Mining & Metallurgy*. He starts by remarking that "If engineers have no organization, they have a plethora of organizations"—some

350 societies, institutes, councils and regional, state and local associations. Admittedly there is "competition, duplication, overlapping and confusion of field and function" tending to cause wasted effort—yet, judging from "the excellence of results," these are "not unmixed evils." After commenting rather critically on a most elaborate plan of super-organization drawn up in 1941 by a special committee of the past chairmen of the Cincinnati Section of the A.I.E.E., Dr. Parsons proposes a simpler realignment in which existing societies would be merged into two groups according to function—one technologic and professional and the other political and legislative. Individual professional engineers would have to be members of the two organizations whose principal point of contact and correlation would be at the level of the local sections.

Dean A. A. Potter, past president of A.S.M.E., and of the American Engineering Council, and recently active in educational and patent matters in Washington, reports a "strong feeling among those in high places in the war effort that as a profession we have not presented a united front as has the medical profession, and that outside of purely technical matters engineers are not exerting strong group influence in national affairs." He regrets the fact that the American Engineering Council was disbanded at a time when the need is greatest for engineers "to think, act and appear as a well-knit and well coordinated professional group."

Other criticisms might be cited but, as Dr. Parsons significantly reports, all of them are from within the profession itself. Apparently most other members of the body politic either believe that the engineers are doing a pretty good job for themselves or, as is more likely, they do not know and do not care.

Perhaps it is too soon to venture an editorial opinion but we can not yet make all these things add up to a demonstrated need for a single super-organization of engineers. It is our feeling that existing agencies

that work "across the board," like E.C.P.D. on professional development, S.P.E.E. on engineering education, N.C.S.B.E.E. on licensing and registration, and the Joint Conference Committee on inter-society affairs, give us fairly effective machinery for doing whatever jobs are necessary above and beyond the definite responsibilities of the different engineering societies. If not, let's see what can be done to strengthen existing machinery before trying to fit the components together into some super-duper engineering bureaucracy.

FOR PROMPT AND FINAL SETTLEMENT

SETTLEMENT of war contracts between the Government and industry must be arranged as promptly as possible. As soon as any firm is no longer needed as a supplier of war goods it must be released for other business. But the arrangements under which such release is given may be even more important than the release itself.

During the past few weeks it has been pointed out by numerous Government officials and by Federal Reserve Board action that such settlements must be made final to be effective. If such settlements are made in a way to involve fraud, of course there should be opportunity for subsequent correction and prosecution. But these officials are emphasizing what should be obvious when they say that further review of settlements should not be permitted except in case of fraud.

It will be impossible for businessmen to go ahead on postwar business if there hangs over them for an indefinite period the chance of readjustment and recalculation of war contracts. It is inequitable and unnecessary to place that obstacle in the way of industry as it seeks quickly to return to its proper peacetime business.

REVERSION OR INFLATION?

RETURN of chemical industries to a peace-time status must come as quickly as possible following the end of the demand for chemicals in warfare. Those plants which were converted to make entirely different war products must soon be reconverted to normal projects. For many chemical industries this means merely a change in customer destination for the output.

Since speed in return to peace-time production and consumption of chemical commodities is highly desirable, it is not too soon now to study those factors which will aid and those which might hinder the reversion process. Presumably, when war demand for chemicals ends or slackens, there will be available plenty of manpower, abundant raw materials, and the machinery and construction materials for the building, remodeling and operation of needed factories.

What then are the factors that might slow down conversion at that stage? Most serious, and least excusable, will be the lack of plans for action. The chemical engineer in management and research must make such necessary plans now. It is not a shirking of war obligation to divert a small but adequate share of present time to the task of planning for the postwar.

Lack of money to finance reconversion is not

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likely to prove a serious deterrent unless the government adopts unwise policies in terminating its contracts or succumbs to the Treasury's demand for confiscatory taxation. Present indications are that ample funds will be available because the credit of most chemical enterprises is excellent. Some, of course, may lack confidence, either to use or to borrow the needed money. If financial requirements are adequately planned in advance, there is much less chance of embarrassment.

Lack of markets may be serious, and certainly will offer problems for some commodities now in prospective surplus. But here again planning for new uses which will be developed in the postwar period should be done currently. New customer prospects should be sought and cultivated. This should be done on a fundamental basis to determine how much the new customer could use of goods that may be more favorably priced in the postwar than ever before. Mere salesmanship is not enough here. Sales development on a sound engineering basis is also necessary.

For many commodities it comes back to the fact that much chemical engineering study and development work will be needed to guide the postwar program of our industries. The advantage of a successful program will be not only corporate profits but public service in restraint of inflation.

SEND THAT CYLINDER BACK

IT'S easy to set an empty chlorine cylinder to one side and forget about it, but doing so under present conditions greatly aggravates the chief problem currently associated with the availability of chlorine. A large proportion of existing cylinders has been diverted to the armed forces while steel for new ones is under strict government allocation. Producers are able to supply more chlorine than ever before and it is up to the individual user to make this expanded production available by keeping steel cylinders on the move.

PATENTS RIGHTS AND WRONGS

PATENTS can never legitimately be used for the creation of unfair monopoly. The courts have often said this. Holding a patent does not justify collusive effort in fixing prices or in restraint of competitive business.

But the converse is also true. A three-judge federal tribunal decided during November that it is not contrary to the anti-trust laws to use a patent in creating a certain measure of monopoly. The Department of Justice is thus told by the courts that the Government may not proceed against a patent owner under the anti-trust status merely because he is using his patent in a proper way for the protection of his profits. In other words, the owner of a patent may, within reasonable limits, set terms under which licensees may utilize the patented invention.

Clearly, the use of normal patent rights must not be made in itself improper. But other decisions have shown that there are many improper manipulations which can develop from a patent right, as is an attempt to peg prices or restrain trade. Patent owners will take real comfort in this distinction made by the courts, even though it will not always be easy to define where the line lies between right and wrong.

PAPER IS AMMUNITION, DON'T WASTE IT!

CHEMICAL ENGINEERS have reason to know what it takes to make a ton of paper and, in turn, what a ton of paper can do in helping to win this war. Paper production for 1943 is considerably below 1942 and 1941. Pulp production, according to next year's estimates, will run even lower. We face a shortage of at least six and a half million cords of pulp wood. The reason, of course, is manpower—especially in the woods, but also in the mills.

Meanwhile the military demand continues to

mount. Major General William N. Porter, chief of the Chemical Warfare Service, reports that every piece of C.W.S. combat equipment must be individually wrapped in three layers of waterproof paper. All smoke and explosive shells for our 4.2 in. chemical mortars are so wrapped and then placed in boxes with waterproof liners. Four 3-gal. decontaminating units require 175 sq. ft. of wrapping paper and 273 sq. ft. of waterproof liners.

Last year the Chemical Warfare Service used 8,000 tons of paper solely for overseas shipment. The entire output of one paper mill is not enough to keep up with the demands for the storage depots alone. What is the answer? As chemical engineers we must push for top production in every pulp and paper plant. But as users of paper, we must push for conservation, save every place where paper is used uneconomically, or unnecessarily. Many normal peace-time uses must now be condemned as wartime extravagances. Let's get squarely behind the government's paper conservation campaign and make sure that the job is done.

WASHINGTON HIGHLIGHTS

CHEMICAL STATISTICS of a very valuable and interesting sort are now being released by the War Production Board for many commodities for which figures formerly were withheld because of the need for military secrecy. Beginning in the last week of November, the Chemical Division started to give out monthly figures on the production of certain important chemicals. These data will greatly aid industry in its current war effort, and will still more assist in programs for postwar production and marketing.

"CARTEL," one of Stuart Chase's "evil words," is becoming a favorite of the demagogues in their reckless criticisms of legitimate enterprise. Few, if any, American firms have actually participated in any foreign cartels, either directly or indirectly. Hence it is to be sincerely hoped that the proper effort of the Department of Justice to restrict unfair and illegal monopoly can find some better way to describe the thing that should be attacked. A smear campaign against American business is not a credit either to the public service or to the intelligence of the officials who make such charges indiscriminately against legitimate American firms.

EQUALIZATION OF PRICES of chemicals is an essential part of a fair allocation program. This does not need to mean that everybody gets all of his chemical supplies at exactly the same price as every other purchaser granted

an allotment. But it is necessary to prevent such abnormal distortions of price as have existed in some commodities where government intervention has occurred. Defense Supplies Corporation lately announced the correction of one such item which related to the supply of calcium carbide. Private industrial output was sold generally at about \$40 per ton. Some of the output managed by the government through DSC was allocated at prices up to \$87 per ton. Fortunately, a more equitable price structure has now been established. Such improvement would be welcome in other cases where the entry of the government into business has disturbed proper buying and selling relationship.

WEST-BOUND FREIGHT may have to be carried in otherwise empty refrigerator cars returning for another load of western fruit. Shippers finding difficulty in getting prompt movement of their goods to the Western States should see whether they can get relief through this practice which is now being urged by the ODT.

RESEARCH BOTTLENECKS are now being broken as most critical materials, with the exception of steel and copper, are becoming available for pushing laboratory investigations through the development and engineering stages. Manpower shortages remain serious, but may be eliminated by Spring as the cutbacks in war production gain momentum.

UTILITY SERVICES must be saved by every industrial unit. Chemical enterprise is urged to economize wherever possible on electricity, gas, water supply, communications, and transportation facilities. All of these utilities consume coal, oil, and other scarce natural fuels. In order to have enough to go around we must, and it is MUST, save or suffer.

LABOR SURPLUS is being quietly but confidentially forecast by certain high government officials. Cutbacks of war production are now reaching the stage of actually closing down certain plant operations. Washington expects this to release more men than will be hired for newly expanded war industry. Those who plan the labor arrangements for process industries can well send their labor scouts to plants being shut down. This will give them a chance to hire higher grade workers than are elsewhere available.

A SERIOUS SHORTAGE of caustic soda and soda ash has developed during the late Fall. This is making necessary a reconsideration of numerous alkali-using projects. Those who cannot get the alkali they need for essential chemical uses might suggest that less alkali be used in making alumina. Such improvements could be accomplished if the government would stop the processing of low-grade bauxite and renew use of the high-grade supplies which now are coming in abundance from Dutch Guiana.

Chemical Engineers Honor Synthetic Rubber Achievement

At a brilliant and colorful dinner in the Grand ballroom of the Waldorf-Astoria Hotel in New York on December 8, almost two thousand members and guests of the chemical engineering profession met to honor the American Synthetic Rubber Industry. Professor Alfred H. White, as chairman of the Award Committee, presented the sixth biennial Award for Chemical Engineering Achievement to more than four-score of chemical, rubber and petroleum companies that had participated

conspicuously in this major development. (See *Chem. & Met.*, Nov. 1943, pp. 94-119). This award was accepted on behalf of the synthetic rubber program by Col. Bradley Dewey, Rubber Director, whose address, together with that of Chairman White, is presented here. A graceful tribute and stirring challenge to the American synthetic rubber industry was voiced by Maj. Gen. Leven H. Campbell, Jr., Chief of Ordnance, whose address will be featured in our January number.

Presentation of Award

Alfred H. White

*Chairman, Committee of Award for Chemical Engineering Achievement
Professor-Emeritus of Chemical Engineering
University of Michigan, Ann Arbor, Mich.*

THIRTY years ago there was held in New York City the Eighth International Congress of Applied Chemistry. The most important paper at that meeting was the one which described the first successful plant in the world to make synthetic ammonia. That plant was located in Germany. It was a period of adulation of Germany. Our young men went to Germany for their doctoral degrees. Their chemical industry was far superior to ours. So at this International Congress in New York in September, 1912, we hailed the achievements of Germany without realizing the sinister shadow which that supremacy in chemical matters was casting over us.

Less than two years later our complacency was rudely shattered by the outbreak of the first World War. We discovered that we were dependent on Germany for almost all of the finer chemical products. Gradually the full story came out showing how the German government through its cartels had throttled our chemical industries. The close of World War I left this country with a determination to be forever free of German domination. That goal has been realized and today the United States is the world leader in the chemical industries.

What elements have caused such rapid development? There have been many advances in the underlying sciences of physics and chemistry, bet-

ter metals for equipment and improvements in the generation and application of power, but the major credit for this rapid progress goes to the chemical engineers who supplied the skill, and to the intelligent management which supported the research and development work during the long period of incubation required before any new development could be presented to the world.

We, who are teachers, take great pride in the knowledge that the developments we are celebrating tonight have been made by young men trained in this country. Chemical engineering is primarily an American development and even Germany has recognized our leadership in it.

When the second World War broke out, our country was vastly better prepared. Almost all of our essential industries had to be expanded greatly and critical materials had to be conserved. Manufacturers of airplanes, tanks and ships faced many difficult problems, but their difficulties could be seen with the eye and corrective measures could also be visualized.

The synthetic rubber program stood in a different category. There were no great plants making similar products. All that we had as a foundation was the scientific information contained in the literature and some experimental data locked up in the files of the research laboratories of companies who

had commenced to study this problem. When the national emergency arose, these companies opened their research files, pooled all their information and thus achieved in a matter of months a result which in normal development would have taken ten years. Synthetic rubber was not a product that could be produced in standard machines and inspected at every step with calipers. The reactions took place in closed vessels under high pressures and were singularly sensitive to slight alterations in conditions.

And so to those industries that have accomplished this great achievement goes the sincere tribute and admiration of the chemical engineering profession. You risked not only the assets and the good name of your companies, but also you, as individuals, risked your personal and professional reputations. If you had failed you would not only have been heaped with reproaches by a public ignorant of the enormous task which was thrust upon you, but our whole war effort would have been imperiled.

We who are teachers, are familiar with the jibe—"Those who can, do. Those who can't, teach." At least we who sit on the sidelines can appraise the over-all picture more calmly than those engaged in the struggle. Perhaps the historian of the future may be able to apportion the exact degree of credit to be divided among the groups and individuals that have achieved this great result. It is clearly impossible to make such differentiation now. Hence it is most appropriate that this sixth Award for Chemical Engineering Achievement should go to the American synthetic rubber industry as a whole.

What About the Postwar Future Of Synthetic Rubber?

BRADLEY DEWEY *Rubber Director, Washington, D. C.*

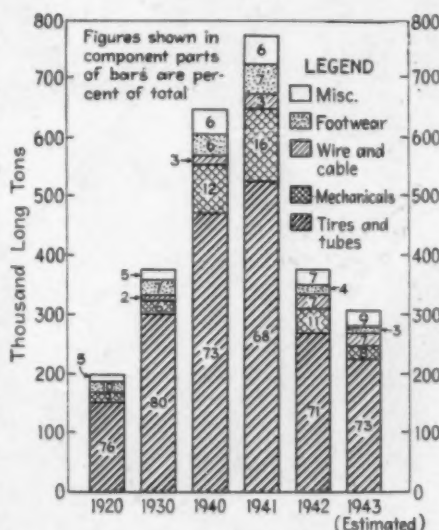
Chem. & Met. INTERPRETATION

In accepting the Sixth Biennial Award for Chemical Engineering Achievement on behalf of the American Synthetic Rubber Industry, Colonel Dewey presented this remarkably clear economic appraisal of the future prospects for continued production after the war. For the first time we are given the facts and figures on which to base postwar plans affecting many related industries. Chemical engineers and executives will welcome this factual, realistic approach.—Editors.

NEEDS of the war were the only reasons for building the huge Government plants to make synthetic rubbers and their raw materials. These plants have already produced over 140,000 long tons of synthetics. This month they will produce about 45,000 long tons, next year over 700,000 long tons, with a capacity by the end of the year of 850,000. These productions are not excessive. They are being used as fast as made. It has been a close call and without the stockpile of natural rubber which was built up under Mr. Jesse Jones' guidance from 125,000 long tons at the end of 1939 to 634,000 long tons at the peak on April 30, 1942, this country would already have faced disaster. We can thank heaven that the Japs did not strike in 1939!

What is to become of the synthetic plants after the war? We must never again run the risk of being caught without either a good-sized synthetic rubber industry or a stockpile large enough to carry us through until standby plants can be brought into production or a pilot-sized industry adequately expanded. I, for one, hold no brief that synthetic rubber should continue after the war as a pampered, subsidized or protected industry. But, of course, we must never again get caught without rubber and the actual situation as to postwar supply and price levels of natural rubber, rather than economic philosophy, will ultimately determine the future. With these thoughts in mind let us objectively examine some of the probabilities, remembering that nothing I present here is to be interpreted as reflecting a set Government policy.

The very nature of the products made or used, and the fire and explosion hazards incident to handling them, led the designers of these plants to build well. If properly painted and cared for as standby plants they would not suffer greatly from atmospheric corrosion. However, wear and tear under operating conditions differs not only from process to process but also



U. S. consumption of crude rubber and latex by major product classification 1920, 1930 and 1940-1943


in the various parts of each process. It will probably average out about the same as for chemical, paper and petroleum refinery plants.

Because of different processes and locations, there is no reason to believe that at the end of the war there will be any relationship between the initial cost of a given plant and the out of pocket cost at which it can manufac-

ture its product. However, the fact that some of the special synthetics such as Neoprene, Buna N and Butyl have qualities not found in crude rubber, will assure them of some place in the postwar picture. Neoprene and Buna N are quite different from each other, but each is relatively unaffected by oils which destroy ordinary rubber compounds. Butyl has very high tear resistance, remains remarkably flexible at very low temperatures, and is most resistant to the passage of air. Some synthetics may find a place in combination with plastics. The qualities inherent in each assure us that these synthetics will survive and that we can let the future determine the extent to which their production will shrink or grow from that of the present program. The gradual determination of what the public will pay for their special qualities will determine the magnitude of the ultimate postwar market for each.

But in the case of Buna S, which represents 86 percent of the present program, the very diversification entailed in spreading of the initial risk by selecting and developing a number of processes means that the units with high processing costs cannot hope to compete after the war. Once conditions return to anything like normal and crude rubber is again importable, the high cost units will have their value only as standby plants or ultimately for what can be realized for their equipment in the second-hand or scrap markets. In short, they will be in the same boat with a laid-up battleship that might ultimately go to the scrap heap because of obsolescence or a disarmament agreement. Just as will be the case with shells, guns, tanks and battleships, they will have done their part in the war effort and the loss they represent will be but part of the tremendous waste incident to any and every war.

The question of what should be done with the low-cost producers will be an entirely different one. What will be their competition? In the past, as a result of various plans and schemes for reducing output, plantation rubber has had a checkered price career which has brought with it uncertainties as to



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Drucker-Hilbert Photo





investment in new uses of rubber as well as hazards as to its backers. Under the latest scheme for restriction of exports from the Far East, starting in 1935 the minimum price f.o.b. New York for No. 1 ribbed, smoked sheets was 10½c. per lb.; the maximum was 13½c. and the ranges for each of the succeeding years were from approximately 13½c. to 23½c.; 14c. to 27c.; 10½c. to 17½c.; 15½c. to 25c.; 18½c. to 25c.; and 19½c. to 25c. The costs of rubber from various plantations varied by about 100 percent dependent upon location, amortization policies, yields of particular plantations and the efficiency of managements.

The past background of some of the older plantations which were built in the days of very low labor charges and had long since fully amortized their development costs was such that they were able to pay dividends with rubber selling below the cost of younger and even higher yielding plantations. The same was true of rubber from native plantings where the natives lived off the land and looked to the yield of a few trees for their "cash crop."

Though the situation at the end of the war will be confused by the variable states of repair and regrowth to jungle that may or may not characterize some of the plantations when the Japs are finally driven out, nevertheless it seems probable that there will be quite a supply of rubber, perhaps over 500,000 tons, which on the basis of prewar costs could be profitably imported with prices f.o.b. New York as low as 10c. per pound. But once the world demand for rubber exceeds the readily available fraction of the total supply, the price will probably be limited by the costs of synthetics. In fact, in the absence of synthetic rubber, the abnormal demand that will

undoubtedly exist for two or three years after the war, while worn-out vehicles and tires are being replenished, would be enough greater than the readily available crude supply to result in abnormal prices until demand slackened or venture capital went to the expense of cleaning out the jungle from overgrown plantings or of planting new areas or replanting old areas with higher yielding stocks.

Faced with such a situation it seems almost obvious that a consuming nation such as the United States, which goes to work and play on wheels and which transports its products and foodstuffs on rubber, will, of necessity, find its low-cost synthetic rubber a heaven-sent brake on the cost of its tires and other rubber products. If we consider that the most rubber ever actually used by this country in any one year prior to 1941 was 650,000 tons out of world shipments of approximately 1,390,000 tons and that at least half of the present 850,000 tons synthetic rubber program should be relatively low-cost Buna S, it is evident that there is a second question which is of greater interest to you chemists, chemical engineers, and executives who have played such a vital part and done such a magnificent job in building up the synthetic rubber program. It is this: We know that we have already made some low-cost Buna S at out of pocket costs, including reasonable management fees but before depreciation, of less than 14c. per pound. But are we going to hold our plants only as standbys to prevent others from charging us over 15c. per lb. or is it possible that some low-cost synthetic rubber can and will be made at prices which will compete with the lowest average price at which the crude rubber producers will be willing to sell their production? Obviously such a price would

have to be less than that price which would make it attractive for venture capital to develop new plantations or replant old plantations under postwar conditions. This will in turn be affected by the extent to which the war has changed the economic perspective of the natives. Will a change in their standard of living change tapping as well as planting costs? The days of imported indentured labor may be over. What taxes are the local governments going to levy to support their concepts of a new order? It has been proven that much higher yields are attainable,—but what will be the costs?

This brings us to the question of the price at which we can expect to see Buna S or its postwar sons and daughters (whether copolymers or tripolymers) manufactured after the war. In this discussion I assume no inflationary changes in values. There is every reason to expect that costs for labor, chemicals, maintenance, supervision, utilities, including a management fee of approximately ½c. per lb., and ¼c. for research, but excluding depreciation, when running at capacity will be in the neighborhood of 4½c. per lb. and that with butadiene at 8c. per lb. and styrene at 8c. per lb. f.o.b. a copolymer plant, the resultant cost of the Buna S, excluding depreciation, will be approximately 12c. per lb. When running at reduced capacity, this cost might be up to 1c. per lb. more. However, of this 12c. approximately 6c. will represent the cost of butadiene and the question of whether or not butadiene can be made at 5c., 6c., 7c., or 8c. per lb. will depend in a large measure upon factors which cannot be too accurately appraised at the present time.

When butadiene is made from alcohol the costs per lb., exclusive of depreciation, will not be higher than the cost of the alcohol used plus 2c. for processing charges. If, and notice that I say "if", alcohol is available at 12c. per gal., the resultant butadiene should cost, before depreciation, not over 7½c. per lb., less any byproduct credits that might be realized from now discarded waste oils and gases. With alcohol at 15c. the corresponding cost is 8.6c. In the case of butadiene from petroleum products the ultimate cost of the butadiene will depend in large measure upon whether the butylenes inevitably produced by the operation of catalytic crackers are worth more for any other use than their value as a constituent of motor gasoline. If crude oils are available at approximately today's prices and motor gasolines continue to sell at the refinery for approximately 5c. per gal.,

butylenes should be available for the operation of some of the butadiene plants at 5c. per gal. Such a price would justify the hope of making butadiene, *before depreciation*, at 7c. per lb. There are some who envision as low as 6c. per lb.; 8c. should be readily attainable.

In the case of styrene it so happens that prospects are for almost identical costs, so that when all is said and done it seems probable that Buna S can be made postwar, *before depreciation*, for about 12c. per lb.

As to the question of depreciation, it is of interest to note that for what now appear to represent the low-cost larger plants of the program the costs per ton per year of plants necessary to build the raw materials for Buna S and to copolymerize them will, after giving due weight to probable actual outputs, be approximately,—styrene \$80, butadiene \$340, copolymer \$150, so that if it is assumed that the postwar costs of these under normal building conditions would be 60 percent of these costs, and it is assumed, after due consideration of the large proportion of the cost represented by permanent structures and utilities, that they should be fully depreciated in fifteen years, the resultant total cost per lb. for amortization of the plants for butadiene, styrene and Buna S running at capacity will be approximately 1.05c. per lb. of Buna S. But many feel that since we have the plants paid for as a cost of war and they are of no going value unless used, why consider even this small depreciation charge?

It does not take any great seer to observe that the above minimum cost of Buna S works out to about the probable minimum price at which venture capital under prewar, but not necessarily postwar, conditions would have gone into new plantations on a large scale. But there is another factor which, in all probability, will play a great part in the postwar picture. The war has given a great impetus to the development of transportation based on the use of petroleum and rubber. The industrial renaissance which has already come to pass in Russia and which is coming in China, India and many parts of Africa, the Far East and other parts of the world, is going to demand tremendous additional tonnages of rubber. Furthermore, in the past the use of rubber has been considered for many places where venture capital would have felt justified in developing new products if it had been assured of rubber at 15c. to 16c. per lb., but where it was not justified when it had to gamble on the price of "futures" and there was

an ever present danger of a runaway price. All too often the success or failure of rubber companies of the past has depended upon wide fluctuation in the price of rubber. If the net result of the competition between synthetics and crudes is a price of 16c. or below, many of these new uses for rubber may be developed.

Buna S, even at this early date, is probably of a quality good enough so that, under postwar conditions, it could without any large price advantage replace up to one-half of the crude rubber previously used. Its quality and the techniques incident to using it are being and will be further improved so that before the abnormally large demands of the war and a few years thereafter have been filled its usefulness should closely approach, equal, or possibly surpass that of crude rubber. By then the problems incident to its loss of strength when hot, its low resistance to cut growth, and its tackiness should have been solved. The problem of hysteresis heating may still give trouble for some uses, but there is reason to hope that it will be solved. In the light of the above, it seems that those who will have to decide as to the postwar handling of the low-cost synthetic rubber plants owned by the Government may well seek to find a way by which they can be operated to give a reasonable

return to the operator and yet permit him to sell the resultant rubber at a price which will set such a ceiling on crude rubber as to preclude any ill-considered speculative plantings which in the long run would result in temporary over-production, followed by the death of synthetic rubber and more world-wide orgies of limited production and high prices for crude rubber. If it seems best to aim at prices in the neighborhood of 15c. or 16c. per lb. there may well be some formula by which industry and the Government will realize some return in lieu of a full amortization or rental charge for all its war costs. Some will argue that the important point is to realize that the money has been spent for war purposes and that without any charge for depreciation any postwar return should be looked upon as an accidental bonanza, not as the just due of the money already spent. Others will argue that the plants should not be operated unless they bring the Government a full return on at least their replacement cost under postwar conditions. Postwar leaders will inherit these problems.

But, come what may, the synthetic rubber program which you now honor has already served notice that prices of 16c. a lb. for crude rubber in the United States of America will mean plenty of competition from synthetics.

William M. Jeffers and Colonel Bradley Dewey atop a 212-ft. distillation tower during an inspection trip last spring. The former Rubber Director (second from left) and the present Director (right) are discussing tower operation with Plant Supervisor Tyson (second from right) and Operator Dodds (left)





Chem Show

BY THE TIME these pages reach their readers the 19th Exposition of Chemical Industries will have passed into history. But as they are written, the Show has hardly more than started and there has obviously been little time to digest the lessons which the exhibits in Madison Square Garden held for their viewers during the week of December 6. Still, a number of worthwhile observations are possible, even on brief acquaintance with the Show, and an attempt will be made here to set them down on paper.

Possibly the outstanding fact that came from the Exposition was the high level of interest it attracted. Before the Show there was considerable pessimism, both on the part of exhibitors and of prospective visitors alike. An attitude sometimes voiced was, "Why do we have to bother with a Show in wartime, when we can't afford the time to go, and have nothing to sell anyway?" Nevertheless, before the doors opened at 2 p.m. on the first day, more than 100 visitors were on line, waiting to get in—unprecedented at the more pretentious peacetime Shows in the Grand Central Palace days. An hour after the opening the floor was crowded, and so it continued. Before the first day was over pessimism had evaporated completely. "It's a good Show," everybody agreed.

And it was a good Show. Only slightly more than half as many exhibitors were there, because only about half the usual space was available. Much less equipment was on display than formerly and the proportion of booths containing only a few chairs and nothing else was a little higher. Still, nearly all exhibitors had made the most of their opportunities, despite lack of equipment to show, and time for the preparation of exhibits. And on their part, visitors came, primed with problems of the postwar era and intent on getting the answers, so far as might be possible at the present time. From the exhibitors' viewpoint the character of inquiries was better on the average than in the past and the proportion of worthwhile contacts was much higher. Several pieces of equipment were sold from the floor, and there were many repetitions of the remark, "You can ship me one of those just as soon as you can make delivery." From the visitors' view-



Retrospects

point, although new products on display were proportionately fewer, they had a most receptive audience for the discussion of their future needs in equipment and materials.

Thus exhibitors benefited from learning of postwar needs, while visitors heard for the first time of many developments still on the drafting board. Catalyzed by this mutual give-and-take, optimism for the year 194X rose like a free balloon and the attitude became, "Whatever else happens on V-day, the chemical industry is going places."

Manufacturers of practically every kind of process equipment were represented at the Show, as well as the makers of industrial instruments and the suppliers of nearly every important material of construction. Packaging materials and equipment were present in moderate abundance, as well as apparatus, furniture and supplies for laboratories. The number of chemical manufacturers was somewhat larger in proportion than at previous Shows of recent years. Book and periodical publishers, consultants and societies topped off the list. While the physical embodiments of equipment were less in evidence than usual, more care had gone than previously into diagrammatic and photographic presentations. Several concerns specializing in complete processes, for example, had put a good deal of care into informative flow sheets. Several others had developed working models to illustrate new principles, often showing the operation more effectively than would have been possible with full-scale equipment.

Considerable evidence was on hand in support of the theory that new materials are going to make a serious bid for the construction materials postwar market. An example is a glass-fabric-reinforced plastic of high tensile strength which can be made into equipment or molded into pipe. Another example where glass plays the lead role is glass fiber tower packing, used as a wartime stopgap in alcohol distillation, but destined to remain for its high efficiency. Many of the newer elastomer plastics were shown, including the synthetic rubbers, with possibilities of use so broad that the range of their applications has hardly been scratched thus far by wartime uses.



From Waste Liquors to War Alcohol

Canada Pioneers for the Continent

JOHN R. CALLAHAM *Assistant Editor, Chemical & Metallurgical Engineering*

Chem. & Met. INTERPRETATION

The first successful plant in North America to produce alcohol from waste sulphite pulp liquors is now being operated in Canada by the Ontario Paper Co., Ltd. The plant, privately financed, is probably the most modern of its kind in the world. In addition to providing industrial alcohol for synthetic rubber and other war uses, this unit is serving to point the way toward economic utilization of one of the continent's greatest industrial wastes. An effort has been made to include in this article detailed economic and technical data so as to give engineers ample opportunity to evaluate the process on its own merits.—Editors.

EARLY in the spring of 1942, Canada's Department of Munitions and Supply foresaw the tremendous demand for industrial alcohol for synthetic rubber and other war uses that would soon develop in that country and the United States. Accordingly, it then requested The Ontario Paper Co., Ltd., to undertake construction of a plant for obtaining alcohol from waste liquors of the sulphite pulp process. This concern had already given consideration to the process, so that construction work was started on such an alcohol plant at the company's Thorold, Ont., pulp mill in August. It is significant that the project, the first of its kind to be successful on the North American continent, was undertaken by The Ontario Paper Co. entirely at its own expense.

In the design, installation and initial operation of the alcohol plant, The Ontario Paper Co. was fortunate to have the assistance of Dr. M. M. Rosten,* consulting chemical engineer, whose experience and knowledge have to a large extent been responsible for the technical success of the plant. Distilling equipment was designed by the Vulecan Copper & Supply Co.

In spite of some priority difficulties, the alcohol unit at Thorold was officially opened June 18, when it was inspected by Rubber Administrator William Jeffers and a party of Can-

adian and United States industrialists, government officials and scientists.

This is probably the most modern plant in the world for production of alcohol from waste sulphite liquors. It is exceptionally clean and gives the impression of being well designed and efficient in operation. A number of improvements have been introduced by Dr. Rosten in this plant over similar sulphite liquor plants in Europe, where the process is one of the most important sources of industrial alcohol, especially in Scandinavia.

CAPACITY AND RAW MATERIALS

The Thorold unit was originally designed to have an annual output of 600,000 United States gallons of 190-proof alcohol.** Processing improvements have since increased this figure to about 800,000 gal., enough alcohol to produce some two million pounds of Buna S. rubber!

This output will, for the duration, be devoted wholly to war purposes as designated by the Canadian Controller of Chemicals. At the same time the plant will serve to demonstrate the feasibility of this method of utilizing sulphite waste liquors, probably the greatest waste in all industry. Thus, The Ontario Paper Co., in financing and undertaking this pioneer commercial venture in North America, is contributing materially to the war effort and at the same time is carrying forward a development of basic importance to the pulp and paper industry.

** Throughout this article United States gallons are used instead of Imperial gallons. One Imp. gallon is 1.2 U. S. gal. 190-proof alcohol has 95 percent ethanol by volume.

In the production of sulphite pulp for paper stock, wood chips are cooked 8-10 hr. in autoclaves under pressure in the presence of calcium bisulphite solution. During this cooking operation a total of about 50 percent of the constituents of the wood are either dissolved or decomposed. Some sugar is present in all raw wood, but more is formed from the cellulosic and hemicellulosic fractions during the chemical digestion, so that the total sugar content of the spent cooking liquors usually amounts to 2-4 percent. Approximately 65 percent of these sugars is fermentable by ordinary yeast. The ratio of waste liquor to the pulp produced is 8-10 to 1 by weight.

The unit at Thorold was designed to handle over 200,000 gal. per day of waste sulphite liquors to give an average alcohol concentration following fermentation of 1 percent by volume. At the present 65 to 70 percent of recovery, some 2,000 gal. of waste sulphite liquor and washings, averaging about 1.6 percent fermentable sugar, is received from the blow pits for each ton of pulp production. The alcohol plant now uses all the available recoverable waste liquor from the Thorold sulphite pulp mill.

At present, more than 18 gal. of alcohol is recovered per ton of pulp produced. However, if priorities will allow the installation of necessary equipment to recover an additional 30 percent of sulphite liquor, the alcohol output per ton of pulp will increase to possibly 25 gal.

Sulphite liquor ordinarily contains, in addition to the fermentable sugar, a certain amount of lime, about 2 g. per l. of bound sulphur dioxide, 1 g. of free sulphur dioxide, a part of the methanol originally produced in the cooking operations, and a considerable percentage of lignin and other soluble organic materials ordinarily not fermentable. Altogether, the liquor usually contains a total of 10-13 percent solids.

THOROLD OPERATIONS

Briefly, the process at Thorold involves the following steps: (1) waste sulphite liquor from the pulp mill is cooled, aerated to remove free sulphur dioxide, then neutralized with lime to

reduce the acidity to a degree suitable for fermentation; (2) lime sludge is separated, after which the liquor is pumped to the fermenters, yeast and a trace of nutritive salts added, and then fermentation allowed to take place; (3) the fermented liquor is run through centrifugal separators which remove the yeast, while the clear beer, containing approximately 1 percent alcohol, is fractionally distilled and the dilute alcohol rectified to 192-proof; (4) the yeast removed by the separators is re-used in the next fermentation cycle.

Sulphite cook in the pulp mill is discharged by gravity from the digesters to a wooden blow pit provided with a perforated stainless steel plate for collecting the cellulose fibers. The stream is directed against a solid target in order to avoid forcing the fibers through the perforated plate. The recovery of fermentable sugar is not complete if only the concentrated drain liquor is used, so a portion of the pulp wash water is added to the drainings to increase the yield of alcohol.

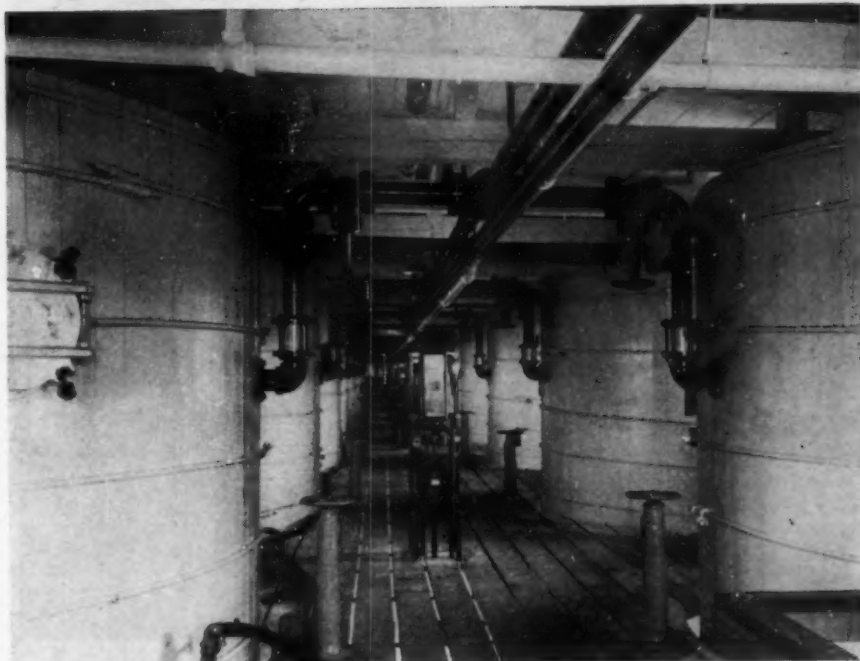
Waste sulphite liquor is pumped from the blow pits to a wooden storage tank. The liquor enters this tank through a screen installed to collect any cellulose fibers present.

LIQUOR TREATMENT

Hot liquor from the blow pits has, on the average, about 1.6 percent fermentable sugar and a temperature of 180-190 deg. F. This goes through a tubular heat exchanger where it is cooled to approximately 85 deg. F. before neutralization. The warmed cooling water is sent back to the pulp mill for make-up use there, and this recovery of waste heat values allows a considerable credit toward the cost of producing the alcohol.

Cooled sulphite liquor from the wooden head tank is then dropped to one of three wooden neutralizing tanks provided with cone bottoms. Aeration is started as the liquor is being run in. A suction fan on the neutralizer vent blows the air and sulphur dioxide outside the building. In the neutralization step the pH of the liquor is increased from an initial 2.5-3.0 to approximately 6.5 by addition of a slurry of slaked lime. Some 68 lb. of lime are used for each 2,000 gal. of liquor.

Fermentation is carried out at about 85 deg. F. in units of two wooden fermenters each having a charging capacity of over 26,000 gal. Approximately 2,500 gal. of recovered active yeast are used from a previous fermentation for each pair of fermenters. When designing this plant, Dr. Rosten promised officials of The Ontario Paper Co. that the fermentation time of the sul-



This control floor of the fermenter building is known as the "Fifth Avenue" of the plant. Wherever possible, non-critical materials such as wood have been used

phite liquor wort would not exceed 45 hours, as compared with the Swedish practice which takes 72-90 hours. However, as a result of his several processing improvements made since operations began, the average fermentation now does not exceed 20 hours!

At the start of the fermentation the pH is approximately 6, but this decreases progressively so that at the finish it is about 5. Carbon dioxide from the fermenters passes through a foam separator, a water washer for the recovery of alcohol, and then to the atmosphere outside.

A portion from the bottom of each fermenter is pumped to a wooden head tank from where it flows to a solid bowl centrifugal separator for removal of sludge, which is sent to the sewer. Clarified beer is run to the beer wells.

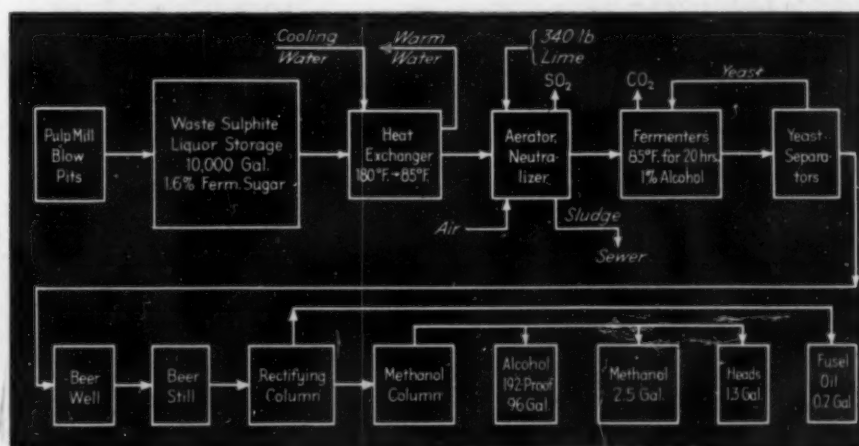
After fermentation is complete, the liquor is allowed to stand for a few

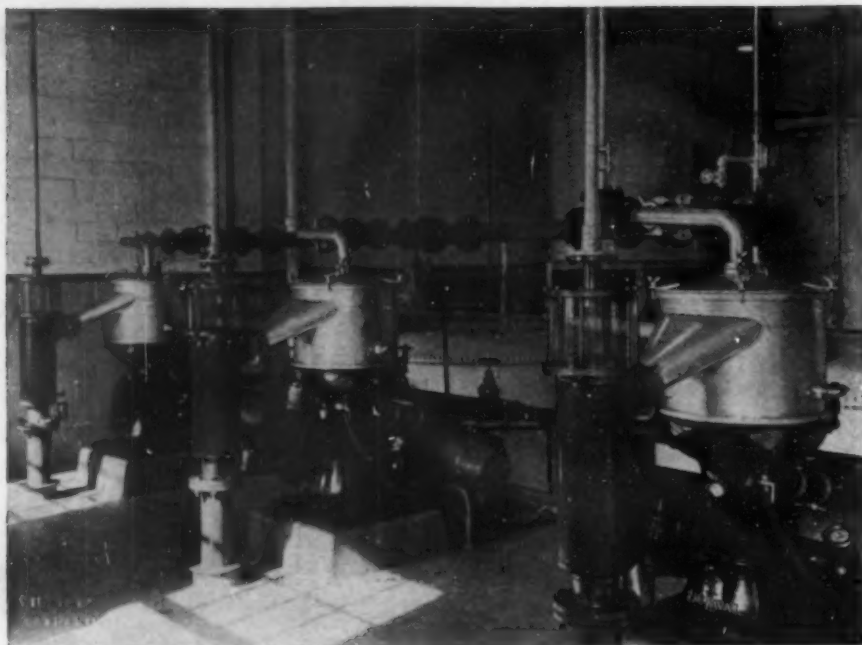
hours for settling of solids, after which it is pumped to a steel tank which feeds the three centrifugal De Laval yeast separators. These special separators, operating at a high speed, were designed to recover yeast from each fermentation batch. They are shown in an accompanying illustration. The separated yeast is sent to steel storage tanks and then, after treatment, to a new batch of fermenters.

RE-USE OF YEAST

Since about 1935 there has been in use in Europe a process for recovering yeast from alcohol production by special centrifugal separators, produced now on this continent. This method of yeast recovery, called the "re-use of yeast" process of the Melle Works, has been applied in the Thorold plant. The method is protected by three American and Canadian patents.

Here is how Ontario Paper Co. now makes alcohol from sulphite pulp waste liquors





Centrifugal De Laval yeast separators are used at Thorold to reduce the time of fermentation and increase the alcohol yield from the sugar content of the liquor

Cost of this recovery equipment is repaid from the savings of about two or three months' operations, since the method improves the alcohol yield from a given amount of sugar by about 28 percent. It is interesting to note that in Europe the recovery of yeast is only about 80-90 percent, whereas at Thorold this has been raised to practically 100 percent.

Advantages of this practice of yeast re-use are obvious when it is realized that in a suitable medium containing sugar, the course of the resulting yeast fermentation by conventional methods normally tends to divide into two stages. In the first, the yeast cells multiply, using sugar for food, until they become crowded. During this phase there is a maximum growth of yeast and a minimum production of alcohol. This period of incubation usually lasts about 25 hours. In the second stage, the yeast reduces its rate of budding or division and continues to feed on the remaining sugar. During this stage there is a minimum growth of yeast and a maximum production of alcohol.

Object of the "re-use of yeast" process is to separate the yeast cells from the beer immediately after fermentation before they can lose their activity. Yeast separated in this way, when added to fresh wort, is able to begin fermentation at once with a maximum activity. At the same time, the building of yeast cells is largely avoided, thereby saving some 6-8 percent of the initial sugar by fermentation of molasses or grain and about 25 percent by sulphite liquor. The time necessary

to cultivate the cellulose in a suitable amount for saturation is also saved and the fermentation cycle is shortened by about 40 percent.

ALCOHOL DISTILLATION

Beer from the yeast separators, together with that from the sludge centrifuge, is sent to wooden beer wells from which the feed for the distillation unit is pumped. At this stage the alcohol content is about 0.7-1.5 percent and averages about 1 percent, in contrast to the 7-10 percent alcohol content of molasses or grain beer.

Sulphite liquor fermented beer is pumped to a beer still, the top of which receives alcohol-water vapor containing about 10 percent alcohol. This vapor goes to the bottom of the rectifying column. The concentrated and partially refined ethanol, taken from near the top of the rectifying column, is fed to the methanol column for final purification. The methanol fraction is removed from the top of this column and high-purity, 192-proof ethyl alcohol is withdrawn from the base of the column to go to product storages. All storing, weighing and loading operations are automatic and under strict government supervision. Quality exceeds the U. S. Army No. 1 requirements for purity.

For an alcohol concentration in the beer feed of 1 percent by volume, steam consumption is 110 lb. per gallon of 190-proof alcohol. With 90 percent recovery of liquor from the blow pits, 25 gal. of alcohol can be obtained per ton of pulp instead of the 18 gal. now obtained. To many

persons, this yield figure will be surprisingly high since practically all references to the process in this country have previously assumed a yield of only 12 gal. of alcohol per ton of pulp. Methanol amounts to 2.5-3.5 percent of the total products yield.

PRODUCTION COSTS

Engineers will be particularly interested in the operating costs of this alcohol plant at Thorold, since it has long been known that technically, the process is not only feasible but also relatively simple. In any field as competitive as that of industrial alcohol, it is the economics of a process that determine if it is to survive under normal conditions. For this reason, the economics at this pioneer North American plant should stimulate further investigations on utilization of sulphite liquors as a source of industrial alcohol and other products. Table I contains some interesting cost figures given by Dr. Rosten before the Gillette Committee on November 10.

About 68 lb. of slaked lime are necessary for each 2,000 gal. of waste sulphite liquor in order to neutralize the sulphur dioxide and other acid constituents. This is equivalent to about 3.4 lb. of lime per gallon of alcohol. Free sulphur dioxide is removed by air blowing. Because yeasts are not grown, the Thorold plant uses only a trace of nutritive salts, the cost of which is a negligible portion of the manufacturing cost.

On the basis of a beer feed of 1 percent alcohol by volume, steam for the stills and rectifying column amounts to about 110 lb. per gallon of 190-proof alcohol. Power to operate pumps, compressors and separators amounts to 1.5 kwh. per gallon of alcohol.

Productive labor at the Thorold alcohol plant consists of four operators per shift, while supervision consists essentially of one chemist per shift. The unit has a modern and well-designed control room.

Product and by-product credits per 100 gal. total products include about 95 gal. of 190-proof alcohol, 2.5-3.5 gal. of methanol, 1.0-1.5 gal. of "heads" and 0.2 gal. of fusel oil. No carbon dioxide is recovered at present.

No charge is made to the alcohol plant, of course, for the waste sulphite liquor raw material, but no credit is allowed for the practical elimination of about 60 percent of the pollution problem (on the basis of B.O.D.) of this material. Yet, in many respects, elimination of this nuisance value can be one of the most important returns from such alcohol plants at sulphite pulp mills. With some minor changes

in the distilling equipment and in the process, some 75 percent of the pollution problem can thus be eliminated.

ECONOMICS OF THE PROCESS

What are the possibilities for this method of producing industrial alcohol? The 1941 production of the 80 sulphite mills of the United States was some 2.9 million tons of sulphite pulp. The volume of spent digest and wash liquors from these mills is so large that the equivalent of about 450,000 tons of sugar annually is being discharged into the streams of this country. Canadian mills are discharging about an additional 250,000 tons yearly. This total of 700,000 tons of sugar is equivalent to about 100 million gallons of alcohol.

Many mills of small capacity, however, would be unable to afford an alcohol plant under peacetime conditions, but it has been estimated that a mill with a daily capacity of 100 tons of pulp could provide for an alcohol plant of economic size. Considering the present inflated wartime price of alcohol, practically all sulphite pulp mills could afford to produce alcohol from sulphite liquor.

However, there are now some 35 mills of over 100 tons daily capacity in the United States with a combined capacity of over 6,700 tons of pulp per day. At an average of 18 gal. of alcohol per ton of pulp, this is equivalent to about 40 million gal. of 190-proof alcohol per year. If the yield is taken at 25 gal. per ton of pulp, the annual alcohol output would be over 60 million gallons.

Alcohol production from a mixture of molasses and sulphite liquor would lower the cost of production for the following reasons: (1) capacity of fermenters used for sulphite liquor would permit a four-fold production increase; (2) by mixing the alkaline molasses with acidic liquors, the cost of neutralizing the sulphite liquor and of souring molasses would be lowered; (3) cost of labor would not be increased, since this four-fold increase in production requires no additional labor; (4) steam consumption would be lowered appreciably since the alcohol content of the beer would be higher. The lowered production costs resulting from the joint use of these materials must, of course, be balanced against the higher raw material costs of molasses.

Such joint production from sulphite liquor and molasses would increase investment costs only by requiring iron tanks for storing the molasses, additional tanks for alcohol storage, and the expense of making certain changes in the distilling equipment.

Table 1—Projected Manufacturing Costs of 190-Proof Alcohol from Waste Sulphite Liquors, Average and Probable Minimum Size Installations¹

	Cost per Unit, Cents	Probable Minimum Size 1,200 Gal. Alcohol With 60-80 Tons of Pulp Daily		Average Size 4,000 Gal. Alcohol With 200-250 Tons of Pulp Daily	
		Factor per Gal. Alcohol	Cost per Gal. Alcohol	Factor per Gal. Alcohol	Cost per Gal. Alcohol
Lime, lb.....	0.35	3.4	1.2	3.4	1.2
Steam, lb. ²	0.040	150	6.0	150	6.0
Labor, man-hr.....	100	0.08	8.0	0.0265	2.65
Power, kw-hr. ³	0.5	1.5	0.75	1.5	0.75
Supervision, man-hr.....	100	0.02	2.0	0.006	0.6
Incidentals.....	.....	.....	1.8	.....	1.2
Total approx. direct cost, gal.....			19.75¢		12.40¢ ⁴

¹ As given by Dr. M. M. Rosten in testimony before the Gillette Sub-Committee on Industrial Alcohol and Synthetic Rubber, November 16, 1943. These figures, which are rather conservative, do not include overhead and amortization charges.

² Steam consumption could be reduced to 110 lb. per gal. of alcohol and should probably be lower in cost. No credit has been allowed for recovered heat values from cooling the liquors.

³ This price of power could be lowered in most cases.

⁴ In a large pulp mill, this cost could be estimated at \$-10 cents.

The remainder of the installation would remain essentially the same.

Waste sulphite liquor contains not only sugar and heat values, but lignin in amounts up to four times the weight of sugar used in producing alcohol. This represents an enormous amount of lignin discharged into the streams of Canada and the United States.

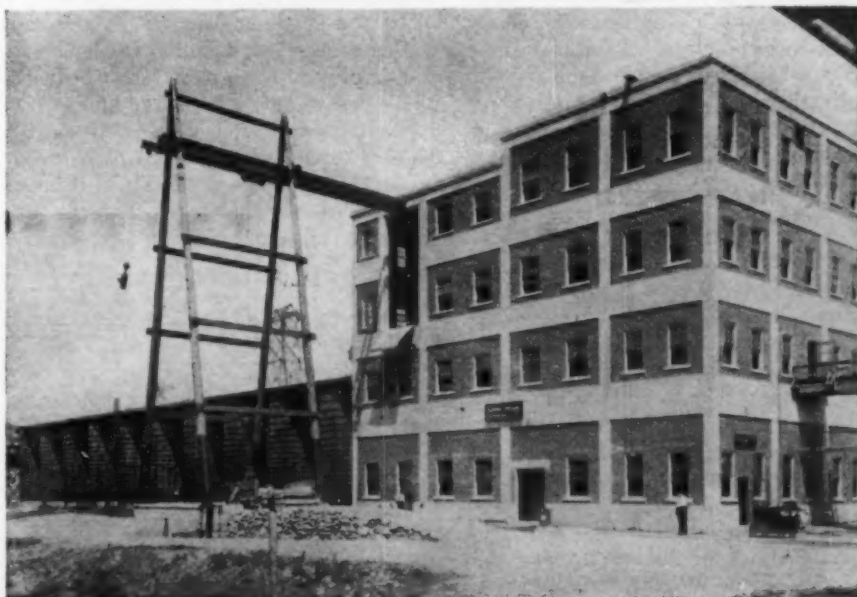
Lignin can probably become an excellent raw material for producing plastics. It has, in fact, already been utilized in relatively small amounts for this purpose. In addition, work at the Forest Products Laboratory has been carried on for some time on the formation of chemicals, especially from the hydrogenolysis of lignin. Recently, an experimental process for using a solubilized sulphite lignin as an impregnant for laminated paper has shown promise.

Exploratory work is reported under way in Canada on the reclamation of the estimated 800,000 tons of lignin

in the sulphite waste waters of Canadian mills and on processes to recover the reported 40,000 tons of acetic acid, 50,000 tons of lime, and 90,000 tons of sulphur discharged in sulphite liquors annually. Recoverable heat values of these liquors amount to 1-2 million B.t.u. per ton of pulp produced.

Thus, while large-scale utilization of the enormous amounts of lignin, alcohol and other chemicals in waste sulphite liquors has still not been attained, it can at least be said that definite progress is being made along these lines. The magnitude of these wastes is a challenge to the ingenuity and sense of economy of the chemical engineer, and it is inconceivable that some 50 percent of the wood used for making sulphite pulp will always have no greater value than as a polluting agents for our streams! When these "waste" values will be put to use in our economy, pulp might itself become the by-product of sulphite mills.

Process and fermenter building of the alcohol plant of the Ontario Paper Co., Ltd. at Thorold, Ont., first on the North American continent to be successful in making industrial alcohol from waste liquors of the sulphite pulp process



Recent Developments in Thermoform Catalytic Cracking

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Chem. & Met. INTERPRETATION

At the meeting of the American Petroleum Institute last year a paper was presented describing the Thermoform catalytic cracking (TCC) process. Since that time the development and application of new types and forms of catalysts have had a profound influence on the design of both reactors and regeneration systems. In addition, a number of newly developed devices have improved the operating characteristics of the equipment. Most of these changes have resulted in simplification of design and better plant performance. It is the purpose of this paper, delivered before the A.P.I. in Chicago on November 11, to describe these improvements insofar as is permitted.—Editors.

CATALYST now being used in commercial TCC units is produced from natural clays and may be in the form of granules or pellets. Improvements in manufacturing methods have resulted in the production of coarser and more rugged types of clay catalyst, and the materials now used commercially fall in the range of about 4- to 10-mesh size.

Use of clay catalysts offers certain advantages, including their availability in large quantities and relatively low cost. These are important considerations in the present emergency in view of the urgent need for large volumes of catalyst required to charge the various TCC units now being rushed to completion. These catalysts also are attractive for certain special applications, as in TCC operations conducted primarily for high butylene production.

BEAD CATALYST

General advantages of using the more active, though more expensive, synthetic catalysts in place of clay catalysts have long been recognized. Until recently, however, the available synthetic materials have not had suitable physical characteristics, notably with respect to attrition resistance, to justify their use in TCC units.

This situation prompted Socony-Vacuum to undertake extensive research work on synthetic catalysts. The ultimate result of this work was the invention of a new material, known

as the "bead" catalyst, which is unique in shape and is outstanding with respect to both physical ruggedness and catalytic activity. This catalyst derives its name from the fact that it is produced in the form of small spherical particles resembling translucent glass beads.

The phenomenal ruggedness and resistance to attrition which this catalyst possesses can be demonstrated in many ways. An individual bead with a diameter of $\frac{1}{8}$ in. will support an average load of about 200 lb., and a mass of beads in a column will support a load of about 3,000 lb. per sq. in. before crushing. In a jet test, where the beads are carried in an air stream at a velocity of 100 ft. per sec. and impinged against a vertical steel plate, they show no breakage and only 3 percent wear after passing through 90,000 cycles. We have not been able to find any cracking catalyst which approaches the beads in regard to either strength or resistance to wear.

EQUIPMENT MODIFICATIONS

Commercial TCC reactors were originally designed with an internal baffle system to provide high throughput capacity combined with efficient contact between oil vapors and catalyst. However, with this design the proportion of the total reactor volume occupied by the catalyst is reduced by the presence of the baffle system. Moreover, the quantity of the catalyst in the unit cannot be varied to provide

maximum flexibility. Thus, although reactors of this type can be designed to operate at any specified space velocity, they cannot be operated below the designed space velocity without decreasing oil throughput rate. The first commercial TCC reactors being installed are of the baffled type and will be operated on gas-oil cracking with clay catalyst which may later be changed, however, to the synthetic bead type.

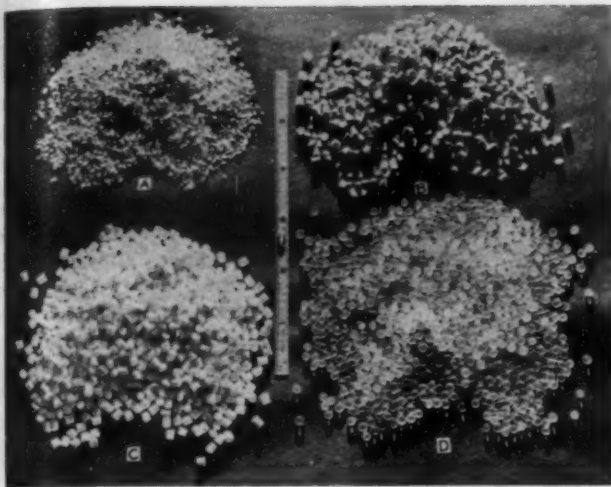
Recent catalyst developments have made it possible to design reactors of high throughput capacity which require no baffle system for obtaining intimate contact between oil vapors and catalyst. The elimination of internal baffling increases the effective volume of the reaction zone, and permits wide flexibility with respect to space velocity. All of the recent commercial TCC reactors are of this improved type. As an added feature of flexibility, the reactors can be adapted to countercurrent or concurrent flow.

Catalyst feed systems of present TCC units are designed to permit continuous flow of catalyst from the atmospheric part of the unit into the reactor, which operates at pressures up to 15 lb. per sq. in. gage. The system employed comprises a feed leg especially designed to provide maximum operating pressure for a minimum leg height.

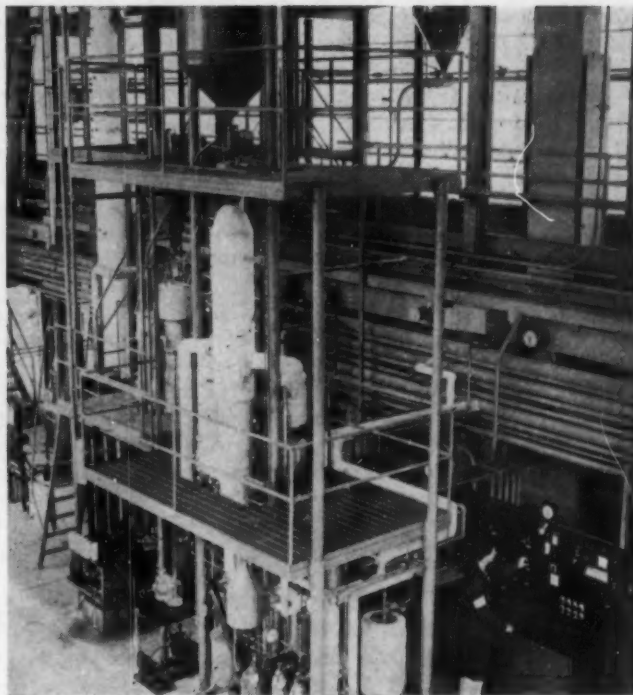
The thermoform kiln which has been previously described is typical of that used successfully in the reactivation of spent fullers earth. This kiln is of the spiral finned-tube type employing a circulating molten salt heat-transfer medium for temperature control.

Kilns in commercial TCC installations are of a radically different and simplified design. This new type of kiln is much cheaper to construct, more flexible in operation, and requires a minimum of alloy metals. Control of regeneration temperatures is excellent, and is achieved without recirculation of either flue gas or catalyst.

Surplus heat developed in catalyst regeneration is utilized to produce high-pressure steam. The kiln operates at substantially atmospheric pressure, and requires only low-pressure blowers



Above—Representative types of catalysts used in petroleum cracking processes, showing (A) clay granules, (B) clay pellets and (C) synthetic pellets as compared to the recently developed (D) synthetic beads of the Socony-Vacuum Oil Co.



Right—A typical laboratory pilot plant used in the development of the Thermoform catalytic cracking process

to supply the regeneration air. The atmospheric-pressure operation eliminates the necessity of employing a catalyst feed leg as is necessary in the reactor.

In order to secure a uniform contact between catalyst and vapors in TCC reactors and kilns, it is essential that the catalyst flow be uniform in all parts of the vessel. This has been achieved by means which also effect a convergence of the catalyst flow to one outlet point, thus permitting the use of a single draw-off pipe.

PRODUCT IMPROVEMENTS

Improvements in the TCC equipment and catalysts have been paralleled by equally important developments in the application of TCC processing to the catalytic conversion of petroleum fractions. At present, the TCC process is playing a vital role in the manufacture of high-octane aviation gasoline, of butylenes for the production of synthetic aviation blending agents and synthetic rubber, and of other essential war products. After the war, TCC plants will also be utilized for making motor gasolines.

Application of the TCC process to the production of aviation base stocks was discussed briefly in last year's paper before the American Petroleum Institute. The original processing scheme comprised TCC cracking of gas oils over clay catalyst followed by once-through TCC treating of the resulting motor gasolines. This operation yields aviation base stocks having leaded (4 ml.) octane ratings ranging from 94 to 97 (AFD*-1C) depending

on the nature of the gas-oil charge stock. Moreover, the aviation base stocks require little or no finishing treatment to meet gum, color, and sulphur specifications.

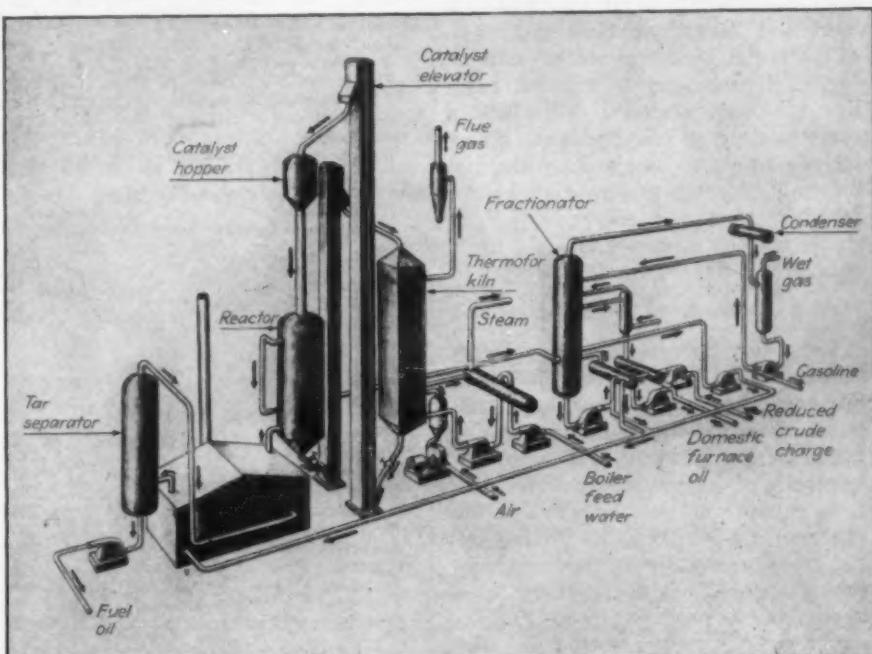
As a result of recent developments, substantial improvements have been made in the application of the TCC process for the production of aviation gasoline base stocks. Chief among these developments are: (1) Invention of the bead catalyst described previously herein; (2) application of improved processing techniques in the treating step; (3) extension of TCC processing to include a wide variety

of charging stocks, other than gas oils, which are well suited for aviation production.

Bead catalyst, most important of these developments, makes possible significant gains in the manufacture of aviation base stocks. With respect to the present aviation fuel program, the substitution of bead for clay catalyst will permit a large increase in plant output or a substantial rise in quality level.

Although bead catalyst produces aviation base stocks of exceptional quality in conventional multi-pass operation, its performance in one-pass

Flow diagram showing principal steps in the Thermoform catalytic cracking process



*Aviation Fuels Division, CFR committee.

operations is equally striking. For example, by one-step processing of properly selected charge stocks over bead catalyst it is possible to produce good-quality aviation base stocks for direct blending in high-grade aviation gasolines. This provides considerable flexibility in processing, and may be translated into substantial economic advantages either for wartime or postwar operations.

Further improvement in two-pass processing technique for the production of aviation base stocks has been made possible by combining the advantages of the bead catalyst and the new type reactor. Briefly, the improved technique results in greater yield per unit volume of charge stock, greater production per unit of TCC capacity, and higher quality of the product.

VIRGIN NAPHTHA STOCKS

Among the most attractive of these stocks are the light and heavy virgin naphthas. Catalytic reforming of these stocks in TCC units over bead catalyst produces exceptionally high yields of aviation base stocks having leaded octane ratings of 98 to 100 (AFD-1C). Moreover, the products have well-balanced boiling ranges, and meet all other aviation gasoline specifications; hence, they may be considered as excellent aviation fuels by themselves, being equal or superior to alkylate and similar synthetic fuels in many respects.

Processing conditions required to obtain the optimum results vary according to the boiling range of the charge stock, but the TCC process has adequate flexibility to meet any choice of conditions without loss in efficiency or throughout capacity.

In addition to virgin gas oils and light and heavy naphthas, the range of potential charging stocks suitable for TCC processing to aviation gasoline has been extended to include a variety of processed naphthas. These include products obtained by thermal reforming, polyforming, and hydroforming of virgin naphthas. Such stocks may be processed in TCC units either over clay or bead catalyst.

MOTOR GASOLINES

Thus far the developments incorporated in the TCC process have been discussed primarily from the standpoint of improving aviation gasoline production. However, the improvements are of a basic nature and, therefore, enhance no less the value of the process for motor gasoline production.

As was previously pointed out, motor gasolines of consistently high quality can be produced by TCC cracking of gas oils over clay catalyst. The

clear CFR motor octane number of the motor gasolines normally produced in such operations ranges from about 77 for paraffinic to 82 for naphthenic stocks. However, both the yield and octane number of the gasoline can be varied somewhat by changing the severity of the operation.

In this connection, it may be noted that the lighter the charge stock, the more severely it can be cracked within the coke-burning limits of the catalyst regeneration system of the TCC plant, thus permitting an added degree of flexibility with respect to the yield and quality of the gasoline produced.

With bead catalyst, it is possible to obtain still higher yields and quality of motor gasoline from a given cracking stock. The improvement in yield by substitution of bead for clay catalyst is directly related to the higher activity of the bead catalyst, while the CFR motor rating of the product is several octane numbers higher than that from comparable operations on clay catalysts. As applied in TCC processing, bead and clay catalysts are both good desulphurizing agents, with a slight advantage in favor of the beads.

Motor gasolines from bead-catalyst operations are also of considerably better volatility than those from clay. The overall advantage of the bead catalyst in terms of increased production, saving in tetraethyl lead, and reduced finishing costs thus marks a high standard of performance in the field of catalytic processing.

Many of the developments made in connection with utilization of charge stocks other than normal boiling-range gas oils for aviation gasoline production apply equally to motor gasoline. For example, preliminary but unpublizable data indicate attractive possibilities for TCC reforming of certain straight-run naphthas and viscosity-breaker gasoline for motor gasoline production. In addition, the TCC process can be adapted to the conversion of low-grade stocks of high boiling range, such as are obtained from crude reduction, viscosity-breaking, and coking operations, into motor gasoline and other useful products.

CYCLE STOCKS

The TCC process also can be applied to advantage in refineries already having installed catalytic capacity (of the TCC or any other type) to increase their production of aviation or motor gasoline by processing cycle stocks obtained as byproducts from existing catalytic cracking operations. Due to their greater refractoriness, these cycle stocks produce somewhat lower gasoline yields than the corresponding virgin gas oils, but the products are of high quality.

Reviewing these various developments, it is evident that the TCC process now offers the unique possibility of utilizing substantially all crude distillate fractions to produce high-octane aviation base stock and useful byproducts, with little or no auxiliary processing other than fractionation.

Table I—Properties of Typical Aviation Gasolines from TCC Processing of Gas Oils over Clay Catalyst

	Naphthenic Gas Oil		Paraffinic Gas Oil		High-Sulphur Gas Oil
	Cracking	Treating	Cracking	Treating	Treating
Properties of 7-lb. aviation gasoline					
Gravity, deg. API.....	63.1	56.5	67.7	60.9	60.1
Reid vapor pressure, lb.....	7.1	7.2	7.0	7.0	6.9
Doctor test.....	Negative	Negative	Negative	Negative	Negative
Mercaptan-sulphur test.....	Negative	Negative	Negative	Negative	Negative
Acid heat, deg. F.....	67	12	92	14	35
Bromine no.....	37.2	4.6	46.1	6.6	17.9
Sulphur, percent by weight.....	0.026	0.022	0.025	0.021	0.061
Accelerated 5-hour gum, milligrams per 100 ml.					
Inhibited and leaded.....	....	2	....	4	5
Octane No. (AFD-1C)*					
Without addition of TEL.....	75.8	81.9	74.4	79.4	79.0
Plus 3 ml. TEL per gal.....	87.3	95.9	85.1	94.3	91.7
Plus 4 ml. TEL per gal.....	89.5	97.7	87.5	96.3	94.0
ASTM distillation, deg. F.					
Initial boiling point.....	108	106	106	105	107
5-percent point.....	131	131	130	129	128
10-percent point.....	139	140	138	140	136
20-percent point.....	150	154	150	153	148
30-percent point.....	164	169	165	165	160
40-percent point.....	181	188	180	182	180
50-percent point.....	200	207	198	200	202
60-percent point.....	216	228	213	223	227
70-percent point.....	230	246	224	243	250
80-percent point.....	245	263	230	259	268
90-percent point.....	264	278	260	277	284
End point.....	304	302	302	305	320
Recovery, percent by volume.....	98.5	98.0	98.0	98.0	98.5
Loss, percent by volume.....	0.5	1.0	1.2	1.0	0.7

*AFD-1C is the 1C method, Aviation Fuels Division, CFR committee.

Complex Heat Transfer Solved By Electrical Analogy

EDITORIAL STAFF

Chem. & Met. INTERPRETATION

Many problems in heat transfer, particularly those where the flow of heat is in two or three dimensions, are extremely difficult or even impossible to solve mathematically. It is especially for such problems that the new electrical Heat- and Mass-Transfer Analyzer at Columbia University is most useful. Taking electrical flow, resistance and capacity as analogous to heat flow, and the heat flow resistance and heat capacity of heat transmission materials, the analyzer uses an electrical network of resistances and condensers and obtains the answers to complex situations with ease and dispatch. The author is grateful to Prof. Carl F. Kayan, Executive Secretary in charge of the administration of Columbia's heat transfer laboratory, and to Dr. Victor Paschkis, Research Associate, in charge of the laboratory's technical and scientific work, for permission to inspect this remarkable development, and for assistance with this manuscript.—Editor.

NOT MANY years ago chemical engineers believed, with considerable justification, that they had taken the initiative in heat transfer investigation away from the mechanical engineers in whose province this subject originated. More recently, however, much productive effort has been exerted in the mechanical engineering camp to regain the lost initiative, as the volume of literature of the last few years will bear witness. Evidence also appears in the Heat- and Mass-Transfer Analyzer, which since 1941 has been in operation in the heat transfer laboratory of Columbia University's department of mechanical engineering. Using electrical flow in a manner analogous to the flow of heat, this device has been solving heat transmission problems so complex as to defy mathematical solution entirely, or at best to permit such solution only with the greatest of difficulty.

The idea of using analogies for the solution of complex engineering problems is by no means new. Industrial instrument makers, for example, have long employed electrical, hydraulic and pneumatic "models" for determining the answers to difficult automatic control problems. Even before the first World War, Langmuir and his associates suggested the use of an electrical analogy for heat transfer, but it should be noted that in the past, most models

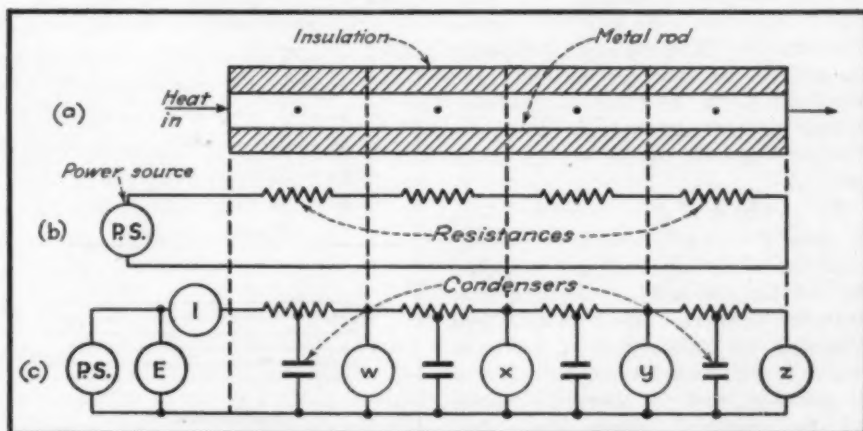
have been based on a geometric similarity to the body for which a solution was sought, whereas the new analyzer at Columbia makes no attempt at geometric similarity, but is based entirely on the use of circuits having equations identical in form with those of the heat flow process being studied.

The present method was originated by C. L. Beuken, a Dutch engineer, during the middle 30's. His co-worker, Victor Paschkis, brought the Beuken technique to Columbia in 1940 where his numerous suggestions for improvements of Beuken's ideas resulted in the

formation of what is now known as the heat transfer laboratory. Funds for equipment were donated by the Research Corp. and the laboratory was set up in charge of Dr. Paschkis, not only with the purpose of improving the theoretical study of heat transfer, but also with the aim of cooperating with industry in the design of complex heat transfer equipment. In the space of two years the analyzer has often proved its ability to duplicate experimental results within the limits of accuracy of the experimental data. On several occasions it has enabled design to be put on a rational basis, where rule-of-thumb had previously been the sole reliance of designers.

Before describing the electrical analyzer and what it can do, its basis should be made clear. Briefly, the equipment consists of a source of direct current power, a network of resistances and capacitances, and the necessary instruments for reading the results of the tests. The flow of electricity is comparable to the flow of heat. For example, electricity flows from a point of higher to a point of lower voltage, at a rate proportional to the voltage difference, while the flow of heat is from a point of higher to a point of lower temperature, at a rate proportional to the temperature difference. The resistance of the flow path to the flow of either heat or electricity depends on the character of the material of the path, and on the

Fig. 1—(a) Metal bar surrounded with insulation offers uni-dimensional heat flow. (b) For steady heat flow the equivalent electrical circuit contains only resistance. (c) When heat flow varies, condensers must be added to the circuit



area and length of the path, so that the rate of flow depends both on these factors and on the driving force (potential or temperature drop) causing the flow. Finally, when the flow of either heat or electricity is not constant, net changes in the energy stored in the material of the path take place and the "capacity" of the material comes into play. Just as electricity is stored in quantity depending on the potential, and the geometry and character of the material of the path, so heat is also stored in quantity depending on the temperature, weight and heat capacity of the material.

These similarities of behavior may be made clearer by examining the equations involved. The steady flow of electricity in a circuit is expressed by Ohm's law, $I = \Delta E/R$, which states that the rate at which current flows in a conductor equals the potential drop along the entire path, divided by the resistance of the conductor. Similarly, in heat transmission, the rate of heat transfer, $q = \Delta T/R'$, is equal to the temperature drop along the path, divided by the resistance of the path to heat flow. Thus a problem in steady flow of heat can be simulated electrically by measuring the current flowing in a conductor when the applied voltage is made proportional to the temperature drop along the heat flow path and when the conductance of the electrical circuit (reciprocal of the resistance) is made proportional to the thermal conductivity of the heat flow path.

When there is a change in the rate of heat flow, an increase or decrease in the heat stored in the path takes place. Then the change in heat stored, $\Delta Q' = C' \Delta T$, equals the heat capacity of the path times its change in average temperature. This is comparable to the change in electrical charge stored in a circuit when there is a change in flow of current. Here, $\Delta Q = C \Delta V$, showing that the change in charge is equal to the product of the electrical capacity of the circuit and the change in potential. Thus, electrical capacity in an electrical circuit becomes the equivalent of heat capacity in a heat transmitting material, and condensers can be used in the electrical network as equivalent to the thermal capacity of the system being studied.

In steady heat flow, however, there is usually no mathematical complexity and the electrical analyzer is rarely needed for the solution of such heat transfer problems. Its principal field lies with the broad class of problems where conditions are changing and flow is unsteady, and the thermal capacity of the material comes into play.

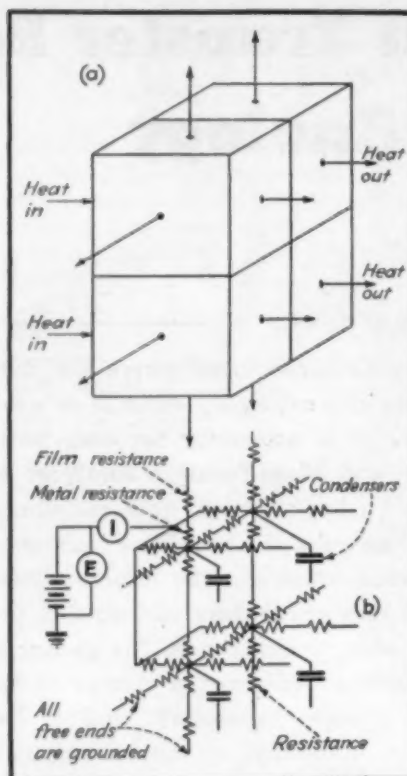
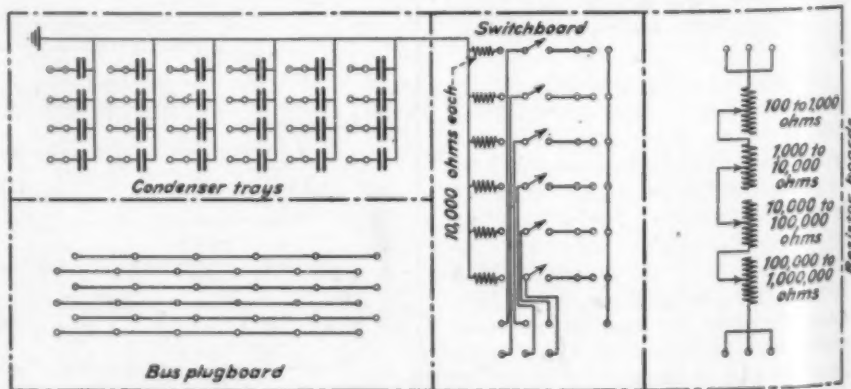


Fig. 2—(a) This block, shown divided into four sections, represents three-dimensional heat flow. (b) One condenser for each section of (a), together with associated resistances, constitutes the electrical equivalent of the heat flow block in (a)

Readily suited to the solution of uni-dimensional flow, the analyzer also lends itself to the more complex problems of flow in two or three dimensions. Another striking advantage of the method is its ability to alter the time factor for greater convenience through proper choice of the constants of the electrical circuit, so that a process normally requiring hours or days can be compressed to minutes or seconds, while another phenomenon normally taking place in seconds or fractions of a second can be expanded to minutes for adequate study.

The method of applying the electrical analyzer to a heat flow problem is to separate the heat flow path into a number of sections and consider that the thermal resistance and capacity of each section are lumped at its center. Fig. 1 (a) is a metal bar surrounded by insulation so that the flow of heat is uni-directional. For steady heat flow its electrical equivalent as set up on the analyzer is shown in Fig. 1 (b) to consist of a series of resistances in a circuit, each of the four resistances proportional to the corresponding thermal resistance of the section of bar represented. The voltage impressed on the circuit is proportional to the temperature difference between the ends of the bar, so that the current flow is proportional to the flow of heat. However, suppose that the bar is initially cold and that a source of higher temperature is then applied to one end. It is desired to trace the rise in temperature at various points along the bar. The equivalent analyzer circuit is shown in Fig. 1 (c) where the thermal capacities of the various sections of bar are represented by condensers of proportional capacity. Since charge will accumulate in the condensers when a voltage is first impressed on the system, or when the voltage is increased, the final voltage at various points in the circuit will not be reached instantly, but its rise can be followed by reading the several voltmeters, w , x , y , and z . When the proper values are assigned to the circuit constants, the voltmeters can be read in terms of temperature rise, and thus the complete temperature history of the problem determined. If the problem is one of continuously or intermittently changing temperatures, rather than a sudden temperature increase at the heated end, it is only necessary to vary the impressed voltage of the model according to the desired time schedule. Temperatures at the points of interest can then be read at intervals in terms

Fig. 3—This diagram represents one of the 15 condenser sections, showing the condensers and resistances, and means for making interconnections



of the voltages at these points, or the values can be recorded continuously. If the rate of heat flow through the rod is to be determined at any instant, it can be read in terms of the rate of current flow, or the succession of these values can be integrated to measure the entire heat flow during any interval.

So far, problems of uni-directional heat flow are the only ones that have been mentioned. Two- and three-dimensional flow can be handled by the electrical analyzer, as can problems in which the path is non-homogeneous. In the latter case, the circuit is set up with varying resistances and capacities, corresponding to the varying heat resistances and thermal capacities of the various materials forming the heat path. For example, the path might be a furnace wall consisting of fire brick, insulating brick, a loose insulant, and a steel casing. On the other hand, if the flow is in more than one dimension, then the body through which the heat is flowing is considered to be divided into a number of sections, each of which is then represented in the electrical circuit by means of a condenser. One side of each condenser is grounded, while the other side is connected to the condensers of adjacent sections along the lines of heat-flow by means of resistances corresponding to the thermal resistances along these lines. The larger the number of sections into which the body is divided, of course, the greater the accuracy of the results shown by the analyzer. At present it is possible to employ up to 115 sections. The method of cross connection between condensers for multi-dimensional flow problems is suggested in Fig. 2. Sketch (a) illustrates a rectangular block receiving heat on one side and losing heat to its surroundings from the other five sides. The four sections into which the block is divided are represented in (b) by a network of condensers and resistances. In the diagram all free ends are to be considered as grounded.

After the method of the electrical analyzer had originally been demonstrated at Columbia using such equipment as happened to be available, it was decided to go ahead with the construction of permanent equipment, designed to handle nearly any problem that might be encountered, and set up for the maximum convenience of use. For example, since it might be necessary to change various constants during an experiment, arrangements were made to permit altering the resistances and capacities during operation, as well as the impressed voltage. In fact, in some experiments where it would be difficult to make needed

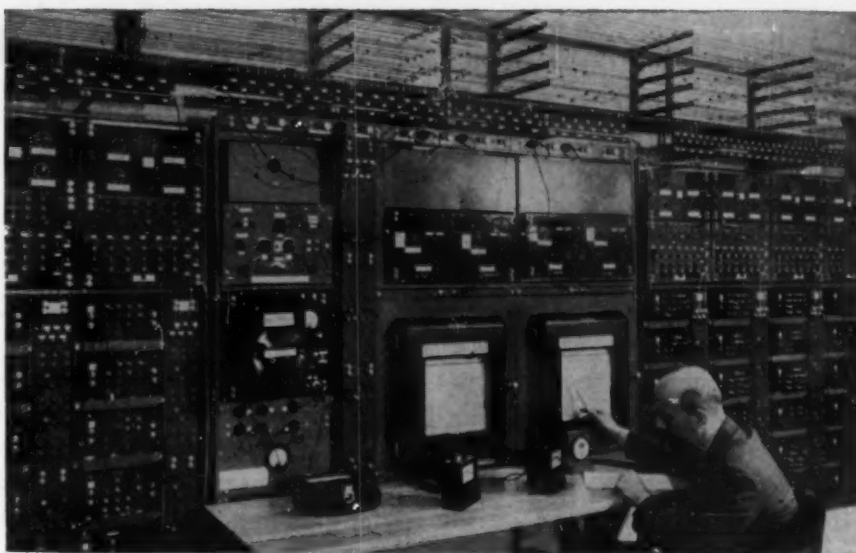


Fig. 4—Dr. Paschkis at the instrument table, which is flanked by some of the 15 condenser sections of the Heat and Mass-Transfer Analyzer

changes by hand, variation of certain factors has been accomplished automatically, according to a prearranged time schedule. It is also desirable to record the various voltages automatically, and equipment was provided for this purpose.

The original equipment occupied three sides of a good sized room and consisted of 15 panels, one corresponding to each of 15 possible sections of an analyzer circuit. Each section was set up as in Fig. 3, the assembly appearing as in Fig. 4. The equipment in a single section permitted the selection of a condenser or combination of condensers of any capacity from 0.1 to 152 mf., in steps of 0.1 mf. It also permitted the selection of a resistance of any magnitude from 100 ohms to 1,111,000 ohms, in steps of 100 ohms. The entire analyzer contained 525 condensers, each of which was accurate within plus or minus 1 percent. Since the circuits used were of high resistance, particular care was taken with the insulation of all parts to minimize leakage to the common ground.

Since the 15 original sections gave comparatively little scope, two new panels consisting entirely of resistances have since been added. Each contains 50 variable resistors and the modified setup permits study of complex problems in multi-dimensional flow. This is accomplished by providing for the connection of any condenser in the 15 original sections to the new resistor panels.

Ingenious means are provided for connections between the various condensers of a single panel, and between the various panels. The condensers in a single panel are arranged in six trays and provided with flexible plug

leads connecting to a bus plugboard by means of which the condensers can be connected to each other and to the resistors. The arrangement provides maximum flexibility of connections, also permitting the condensers of one section to be connected to the busboards of other sections. Connections between individual sections and the appropriate instruments are made by means of 36 buses which run along the top of the installation. All together, there are several thousand plug connections in the entire installation.

Power is provided by means of a rectifying unit which furnishes practically constant direct current from the regular a.c. supply, at any voltage from 130 to 286. Voltages from 130 down to zero can be provided by means of a voltage divider. An electronic current regulator is also provided, to maintain the current constant at any value from 0.1 ma. to 30 ma. during an experiment, regardless of changes resulting from condenser loading.

The instruments, which are centrally located, are largely of special design. The currents employed are small so that the voltmeters must themselves draw exceedingly small current. Therefore, electronic amplifiers are used for the voltmeters, designed to draw current so slight as to be negligible. Total current flow is recorded by an ampere-hour meter which is also of the electronically amplified type.

Possibilities for use of the electrical analyzer are so broad as to be practically unlimited. For example, it has been used to study the temperature distribution and heat losses in intermittently heated furnace walls; and in the walls of furnaces with irregular temperature cycles. It

(Continued on page 125)

Overcoming Some Difficulties In Materials Handling

WILBUR G. HUDSON *Mechanical Engineer, Chicago, Ill.*

Chem. & Met. INTERPRETATION

Materials handling problems are often deceptive, especially in the handling of chemicals and other process industry products, many of which are fragile, corrosive, abrasive, sticky or hygroscopic and thus introduce unexpected problems. From many years experience as a consultant and engineer on materials handling, Mr. Hudson has selected a number of interesting examples, which offer valuable lessons in themselves, and may in addition prove suggestive of solutions for the handling of similar materials.—Editors.

PROBLEMS entering into materials handling installations for chemical manufacture are more difficult and uncertain in the results attainable than in other industries because of the wide range of physical characteristics of the materials encountered.

The best type of conveyor for materials which are extremely fragile, and must not be broken down or degraded, is not readily determined. Flakey products such as breakfast food flakes and soap flakes are typical of fragile materials calling for the gentlest handling. Pelletized carbon black is another. These little granules seem to have a surface tension which causes them to disintegrate almost at a touch. Obviously a pneumatic conveyor, scraper flight conveyor or screw conveyor will cause more degradation than a slow speed belt conveyor, a continuous bucket elevator or carrier.

Some of the great plants manufacturing metallic magnesium from magnesium chloride flakes encountered a serious difficulty. The magnesium chloride as fed to the batteries of retorts is hygroscopic and has somewhat the appearance, and almost the fragility, of corn flakes. It must be fed to the hoppers which feed the retorts continuously and must not be partially pulverized, or the efficiency of the retorts will be impaired.

The problem calls for a runaround conveyor in a horizontal path and several hundred feet centers for each battery, with partial discharges to each retort hopper. A flight type conveyor would grind up the flakes. A belt conveyor would assure gentle handling but there is no possibility of providing partial and varying intermediate dis-

charges from a belt. A pneumatic conveyor would very nicely solve the multiple discharge requirement but the flakes would quickly be pulverized.

This problem was solved neatly by N. L. Davis of the Link Belt Co. who used a novel runaround carrier having a train of buckets with hinged discharge flaps (Fig. 1), held closed throughout their path of travel by a trough plate. However, the flaps swing down to discharge the buckets as they cross the chutes. Since the drag of the flaps across the material in the filled chutes would cause some degradation, an arrangement is provided to insure that whenever a chute is nearly filled, the flaps cannot drop when crossing that chute. This is accomplished as indicated in Fig. 2, by a lever which is periodically lifted by a lug on the side of every tenth or twelfth bucket. When released by the lug the lever falls either completely or until it rests on the surface of the material in the chute, but it cannot penetrate into the material. When resting in the elevated position, which it thus retains when a chute is nearly filled, it also holds up another lever which forms a track for the flaps, permitting them to cross the gap without discharging.

The residual material beyond that which feeds out to the battery of chutes, carries around or recirculates.

Materials which are actively corrosive are difficult to handle. They may be both corrosive and abrasive, which further complicates the selection of suitable conveyors. "Bug dust," the fine residue in bituminous coal preparation plants, which sometimes contains rock dust, is an example. When wet, this material will cut through

sheet steel in a few weeks. The casing of a continuous-flow conveyor is vulnerable to this attack as the material is in pressure contact along the four sides of the duct. Furthermore the chain joints are rapidly corroded by the acidulated water. Casing sections of cast iron would solve one part of this problem. A flight conveyor with a cast iron trough, and with the loading controlled so that the chain is clear of the load, is better when the path is horizontal or inclined, and a bucket elevator is better when the path is vertical.

Very difficult circumstances may arise when the material is sticky. As such material may be also abrasive, the difficulty is intensified. The sludge formed in sewage treatment plants is perhaps the best illustration. In Chicago's Stickney plant, continuous-flow type elevators were installed to lift this sludge. It adhered to the walls of the duct, soon building up to a thickness which jammed the flights. It was necessary to open the casing at frequent intervals to cut away the deposit. A bucket elevator was substituted but the sludge adhered to the buckets and would not discharge. As the sludge contains a fine grit the chain joints cut out.

An elevator for sludge is perhaps the toughest problem in materials handling. If the plant layout cannot be arranged so that the material passes downward from the filter-dryers by gravity flow, it is possible that a continuous-flow type of elevator would function if the flights were staggered, with chisel edges on opposite sides and with a casing of stainless steel or possibly of glass.

Some innocent appearing materials develop unexpected trouble-making characteristics. Spent brewers grains, which resemble oatmeal porridge, would seem to be easy, but when this material is at a temperature higher than 125 deg. F., the lactic acid content quickly corrodes and ruins a malleable iron chain.

Soda ash is nicely free flowing, non-corrosive and non-abrasive, and would be adjudged off-hand among the easiest of materials to handle, yet sometimes it shows a stubborn disinclination to let go of the buckets of a cen-

trifugal discharge elevator and carries over the head, substantially reducing the capacity of the machine. However, it behaves properly in a slow-speed continuous bucket elevator.

Sulphur is another material in this class. It may be handled in almost any type of mechanical conveyor, but it has a strong tendency to build up a static electrical charge when chuted and the resultant spark discharge may be dangerous under some conditions, especially in an atmosphere of sulphur dust. This matter of explosive dust must be considered carefully with such materials as charcoal, grains, dry coal and starch. The Board of Fire Underwriters pamphlet on this subject, which covers the approved makeup of conveyors, vents, casings and chutes, is an interesting study.

Some of the clays are troublesome because of their tendency to pack or stick in chutes. Pumice has the further characteristic of being abrasive, though its cutting action in the chain joints is not severe.

One odd problem and its solution are of interest as applicable to other situations. A brand of macaroni packaged in short lengths—"elbow macaroni"—comes from the ovens to a belt conveyor operating at slow speed to permit cooling and hardening, and is then elevated to an upper floor. There was the risk that small fragments of non-magnetic material such as stainless steel or Monel metal might get into the macaroni, and be unremovable by magnetic separation. Even a single such fragment might result in costly damages.

A positive separation was provided

by a pneumatic elevator, as shown in Fig. 3. The elevator pipe has an adjustable inlet located just above the discharge end of the belt conveyor. The position of the intake is adjusted so the air stream will just lift the macaroni but cannot lift heavier particles which therefore are carried over the head pulley and drop to the floor. This is an effective way of separating stray, heavy, non-magnetic particles from a material. The layout may be reversed and stray, light particles separated from a heavy material. A constant-pressure, variable-volume exhauster (centrifugal fan) is preferable in such operations to the usual variable-pressure, positive blower.

Copra, when in fragments, offers no difficulties for the materials handling engineer, but when ground up as in the manufacture of soap is sticky and often contains abrasive sand. It is somewhat reluctant to let go of elevator buckets into which it is loaded, and tends to plug up a continuous-flow elevator. Often the use of air jets to expedite the discharge is not permissible so if a conveyor of this type is installed it should be one that can be provided with a positive push-out plate or some other method of forced discharge.

In processes where loss of heat during transfer is to be minimized the continuous-flow type of elevator or conveyor has distinct advantages. The material is handled en-masse, thus preventing the circulation of air. Furthermore, the rectangular casing is easily incased with a suitable commercial insulant (see Saginor, *Chem. & Met.*, p. 82, Jan. 1941). However, it

should be kept in mind that malleable iron chains cannot be heated to above 450 deg. F. without impairing their strength. In the casing of a bucket elevator handling hot material there usually is an up-draught, especially if the elevator has considerable height.

For materials at a higher temperature, the pivoted bucket carrier may be the best selection. It has a capacity range up to several hundred tons per hour, a remarkably low cost of maintenance, low operating cost and low power requirement.

If cooling in transit is desired, the pneumatic conveyor has advantages. When discharges to separate bins are involved these are easily provided by duct switches, as in Fig. 4, if the conveyor is of the pressure type, as distinguished from the suction type.

Storage frequently enters the problem, and with some materials discharge from a bin is difficult because of arching. An electric vibrator attached to the bottom of a bin or hopper will sometimes facilitate the outflow—and sometimes not. For example, in paper making the flow of wood chips to the defibrators must be maintained without interruption. Wood chips, however, tend to arch. A vibrator attached to the chute lines up the chips so they slip and flow evenly. On the other hand, a container filled with foundry sand or clay packs instead, when vibrated.

Sometimes arching may be prevented and outflow facilitated by suspending one or two thin sheets of stainless steel down through the bin or chute. Multiple air jets are another well known device.

Fig. 1—Method of operation of Davis horizontal conveyor for magnesium chloride flakes

Fig. 2—Mechanism for preventing discharge to filled chutes with the conveyor shown in Fig. 1

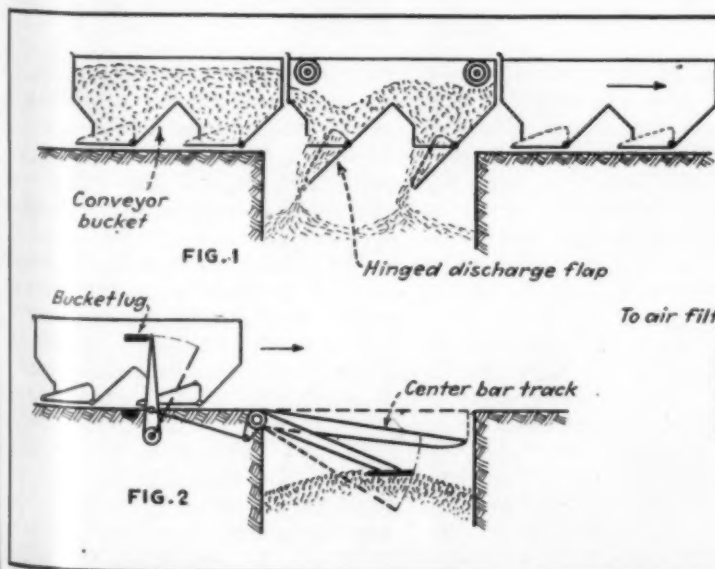
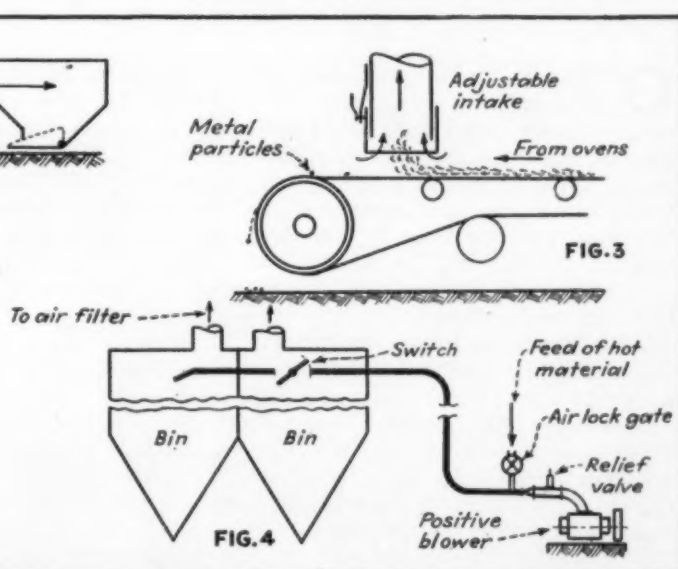
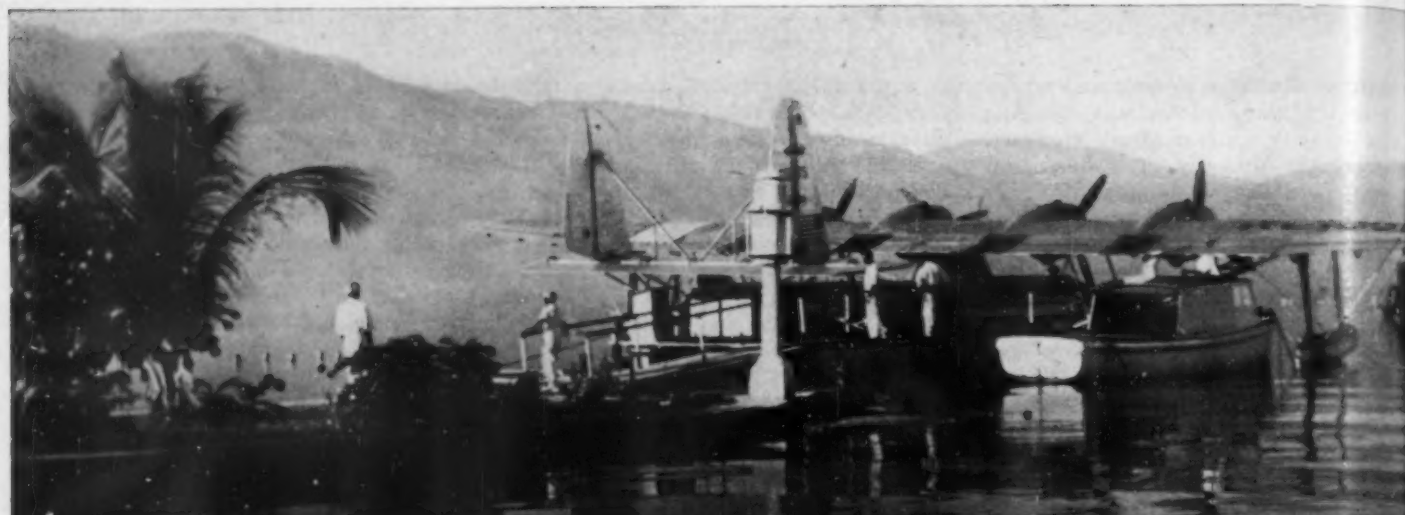


Fig. 3—Many light materials can be separated from metallic particles by this "vacuum cleaner"

Fig. 4—Method of distributing discharge of a pressure-type pneumatic conveyor; note the "switch"





CHEM & MET REPORT ...

An Editor Travels Through West Indies and South America

One unusual experience after another was crowded into a five-week trip through the West Indies and South America, which James A. Lee, managing editor of *Chem. & Met.* recently made under the auspices of the U. S. Government's Rubber Development Corp. Airplanes were used for covering the 15,000 miles over some of the wildest, highest, most colorful areas on the face of the earth.

His experiences and impressions will be presented in a series of articles commencing in this issue. In the first one he takes you to Haiti where

he encountered voodooism and cryptostegia. From Haiti via Puerto Rico and Trinidad, he flew to the Amazon country of Brazil and Bolivia where he experienced the hardships of the valley, the terrible heat and humidity of the jungle, visited the Ford rubber plantation, and saw the seringueiros. He soared 19,000 ft. to cross the Andes and visit the colorful city of Cochabamba. Turning east he went to the extremely modern coastal cities of Brazil with their process industries plants of which they are justly proud. In subsequent articles, Lee will discuss rubber programs in these countries.

OCTOBER 5: Preliminaries, such as passport and visas, police record, health certificate, draft board permission, injections for typhus, yellow fever, typhoid, para typhoid and smallpox having been completed, I left New York by train on Tuesday evening, October 5th, for Miami.

October 7: The group that was to take the trip gathered there on the 7th for inspection by customs, immigration, F.B.I., army intelligence and navy intelligence.

October 8: After another inspection by customs we took off from the Dinner Key Airport in the "Brazilian Clipper," a Sikorsky 42, four-motored seaplane, for Haiti. After a beautiful trip the airplane circled over the

northern area of Haiti, where we saw LaCitadelle, which was built 200 years ago by Henri Christophe, self-styled Henry 1st King of Haiti. In its construction 20,000 lives were lost. We also saw Cape Haitian, second city in the republic, cryptostegia and hevea rubber trees, bananas, and coffee growing. We landed at Port au Prince, the capital.

October 9: Early in the morning we left in automobiles for Gonaives, 75 miles to the north. A sugar house or two were passed. A stop was made at a decorticating plant for SHADA's (a cooperative effort of the governments of the United States and the Republic of Haiti) sisal which it cultivates on 10,500 acres, the first process

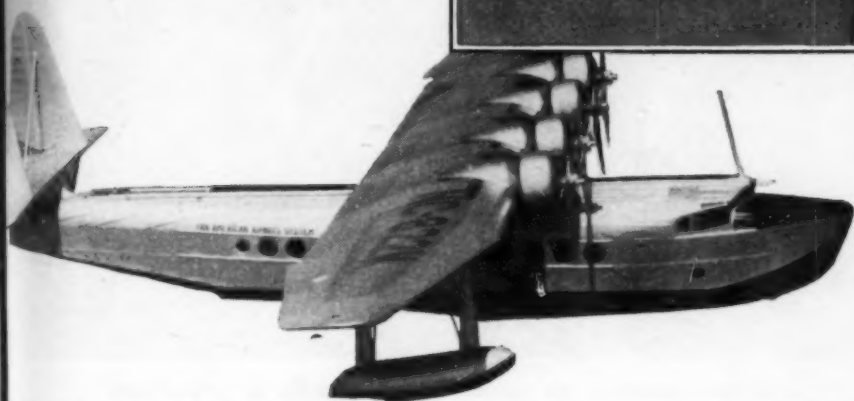
industry plant visited. Finally, we reached Gonaives but continued on several miles beyond the town to SHADA's Cryptostegia Research Experimental Station where we were established in a thatched roof building for our visit.

The afternoon was spent in viewing some of the 30,000 acres that have already been planted in cryptostegia, 7,260 plants per acre. Thomas A. Fennell, the president and general manager, told us that he expects to get 100 tons of rubber this year, 3,000 in 1944, and 10,000 to 12,000 in 1945, which will probably be the limit for production in Haiti. The cryptostegia vine can be tapped within a year after planting. At the small coagulating

plant, which was put into operation the day we arrived, I was surprised to see that no coagulant was required. Amortizing the investment on a five year basis the present cost of rubber is 62c. per lb. Much work has been done with various fertilizers but so far there have been no positive results.

October 10: The return trip to Port au Prince was through many banana plantations. Many varieties of bananas are grown but only one is exported, and only a few are eaten raw.

Our hotel was on the side of a hill and from my window I could look over the city spread out in the valley below, a beautiful sight but from which came the greatest serenade I had ever heard. Dogs by the thousands were struggling to outdo each other. By 1 or 2 o'clock in the morning they gradually became exhausted and dropped out of the chorus. However, the vol-



later—for breakfast at the Pan American Airways staff house and the take-off for Belem, Brazil. A stop for refueling was made at Paramaribo in Dutch Guiana. On arriving at our destination we went to the Grande Hotel and changed from khaki to badly wrinkled business suits, and attended the dinner given by Douglas H. Allen, president of RDC (Rubber Development Corp.) to the interventor of the state of Para, Col. Joaquin Magalhaes Barrata.

October 14: A visit was made to the Instituto Agronomico do Norte (Federal Agricultural Experiment Station). This is the first of 12 such stations that will be built. The director, Dr. Felixberto Camargo, discussed the work that is being done to grow timbo, the root of which is used in insecticides; jute; rubber and other crops. A new method for coagulating rubber has been developed and is now being introduced. As alum is difficult to obtain for coagulating the mangerbeira rubber, latex from the eachanguba tree is substituted. Dr. Camargo is certain that the Amazon eventually

ume of noise failed to diminish. For every dog that had been barking there now were ten roosters and each was determined to crow louder than his fellow creatures. Instead of waiting for dawn as do our well-mannered American fowl these Haitian feathered natives get a much earlier start. And this was not all. From the hills behind the hotel came the beat of the native drums, and from nearby the strange singing of a voodoo ceremony. Such was my night in Haiti.

October 11: After a cup of Haitian coffee at 5 A.M. and a piece of toast that did not want to stay with me, we took off for Trinidad. When stopping at San Juan to refuel we received warning of a hurricane ahead and so remained on the island until the next morning. On hearing of our presence in town, Governor Tugwell invited the party to his home, Fortaleza, for tea.

Puerto Rico has difficulty obtaining certain foodstuffs and as a result development work has been undertaken and a plant will be built to produce yeast from molasses which can be used to fortify available foodstuffs. In a further effort to make the island self-sufficient a glass bottle plant is under

construction to supply the rum industry.

October 12: Breakfast was had on the plane in order to get an extra early start for Dutch Guiana. However, due to difficulties we stopped instead at Port of Spain, Trinidad. Here the driving on the left side of the road almost ruined most of us. But the main interest was the sight of the Hindus in their native dress cooking on open fires in the public square. Chinese were everywhere. Places of business had been closed for the day at 1 P.M. due to lack of merchandise.

October 13: A rap on the door at 4 A.M.—we were never allowed to sleep

Sleeping quarters during visit at Gonaives, Haiti, to see cryptostegia





In Haiti's rugged country grow cryptostegia and hevea rubber trees, bananas, and coffee. Fruits are everywhere

will be able to produce 10-cent rubber. I wish that I could be as certain.

In the afternoon a trip was made in Higgins boats to see one of the rubber workers camps, Tapaná, on the Amazon a few miles above Belém. The shortage of manpower is the principal factor that limits the production of rubber in the Amazon Basin. A Brazilian organization, Senta, was established to recruit labor. The recruits come mostly from the northern states of Brazil, a majority from the state of Ceará. They contract to work in the rubber forests for two or three years. This year about 25,000 "seringueiros" will be added to the number of rubber collectors already in the Amazon.

Senta sends the men first to camps which are operated by Sava, an organization created to receive the labor in the Amazon and place it in the producing areas. In these Sava camps such as Tapaná they are kept for several weeks or longer while they receive a thorough physical check-up and treatment for ailments. At the time of our visit at Tapaná there were about 1,250 men. The camp has a capacity of 4,000. The workers are transported up the river in the boats "Cambridge"



Natives cultivating the ground for the planting of cryptostegia. 30,000 acres have already been planted, 7,260 plants per acre

and "City of Delaware" of the Colonial Line, which I was accustomed to see in the Hudson River at New York before the war.

October 15: A rubber warehouse was visited. All rubber from Bolivia, Peru and the Amazon country passes through Belém. Here it is inspected, graded, washed and sent on its way. Of the 30,000 tons that will be col-

lected in these countries in 1943, 10,000 tons has been allotted to the factories in Brazil and 250 to the Bolivian government.

In the warehouses were many tons of Sumatra and Belgian Congo rubber which had come from ships sunk along the Brazilian coast. This rubber is washed, graded and shipped to the United States.

October 16: Up at 4 A.M. for the start up the Amazon. A refueling stop was made at Santarém, where in 1865, several families from Charleston, S. C., and other Confederate cities migrated with their slaves. Three of the original group are said to be here at the present time.

A few minutes flying time and we arrived at Belterra on the Rio Topajoz, a tributary of the Amazon, where the Ford organization has a rubber plantation. A start was made some years ago with wild tree seedlings. They have been grafted with high producing stock from Malaya and are now being grafted with disease-resistant stock. At the present time there are 17,000 acres planted with 3,500,000 trees. The yield of rubber will be about 300 tons in 1943 and will gradually increase until it reaches 6,000 tons by 1950. In place of the usual galvanized iron or gourd cup used for collecting latex, Ford is relying on cups made in Detroit from soybean plastics.

Here I met J. A. Zilles, the plantation superintendent and a chemical engineer from Detroit. He told me that their latex is concentrated before shipment. It is treated in a cylindrical tank with ground seed from the zertahy tree found in the jungle nearby. After settling for a day the upper half contains concentrated latex of 60 percent.

After bidding farewell to the Ford officials we boarded our planes and

Cochabamba, Bolivia, is one of the most colorful cities in the world. It is in the Andes Mountains at an altitude of 8,500 ft.



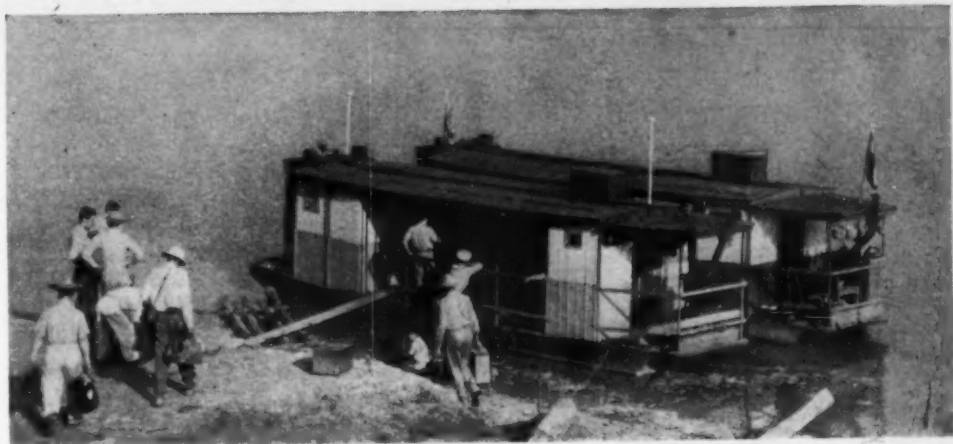
resumed the trip to Manaus, a 1,000 miles up the Amazon. We were flying over country inhabited by the head hunting Xingu Indians who are on a rampage now. Some seringueiros already have been killed, while others are making haste to get out of the region before they too suffer the same fate. On arriving at 16 hours (4 o'clock) we were taken to the RDC staff house where headquarters were established for our visit in Manaus. The city is on the Rio Negro near its convergence with the Amazon. The enormous volume of water that flows down the river during the rainy season causes a rise of 85 ft. in the level. This accounts for the floating docks that may be seen along the water front. Strange as it may seem the river at Manaus has a depth of 285 ft. during the dry season.

October 17: (Sunday)—We were allowed to sleep until 7 A.M. The day's functions commenced at 9 A.M. with a party given by the mayor and leading citizens. Then back to the staff house for dinner which is served at 11 A.M. in Manaus. At five we were off again, this time for a reception at the fine new building of the Associaçao Commercial do Amazonas. It is a splendid example of the Brazilians' use of concrete to resemble marble. They are far ahead of us in concrete work, not only for this purpose but for construction as well. This reception by the association was followed by one at the home of the American Vice Consul, Forrest Daggett.

October 18: We saw the Teatro Amazonas, a \$5,000,000 theatre built in 1890 when great fortunes were being made from rubber, and about which numerous stories have been written. Opera companies were brought from Italy and France to supply the entertainment. From there we were taken to see a small rubber plantation where seven trees were being tapped and the latex smoked. For the second day the water system in the city failed to operate. This failure often occurs in Manaus, I was told.

October 19: Breakfast was at the staff house at 5:15 A.M. As usual our morning meal consisted mainly of bananas, pineapples and oranges; and very fine they were. A band was at the airport to give us a sendoff. Most of the group used a Catalina flying boat, PBY, captained by "Poncho" Ramsey, a favorite with the Brazilians. I was assigned to a Lockheed Electra, piloted by F. L. Sage.

Heading southwest we flew 500 miles arriving at Porto Velho at noon. It is the northern terminus of the Madeira-Mamore Railroad, which is famous for 10,000 lives lost through malaria, yellow fever, and Indian kill-



Boats were used for a trip down the Rio Beni. At noon we went ashore to see rubber trees being tapped by a seringueiro

ings in the building of the first five miles. This is perhaps the most isolated railroad in the world; it has no branches, and makes no railroad connections. Its nearest neighbor is more than 700 miles away as the crow flies and its southern terminus is Guajara-Mirim on the Brazil-Bolivia frontier.

Two new cars resembling buses, seating 12 to 15 persons, took us a few miles out of town where we saw latex being collected and smoked. I have been told that our party then inspected other rubber facilities in the town but at this point I was forced to retire to a hammock at the local RDC staff house where I remained until the planes were ready to continue their journey several hours later. The food, the water, or was it the guadiana of the previous day that had finally gotten the better of me?

A short flight brought us across the border into Riberaltá, Bolivia, a town of 5,000 to 6,000 people, depending solely upon the Rio Beni for transportation. Not a road led out of the town nor was there an automobile in the entire village. The sole means of travel within the place was an ox-drawn two-wheel cart, which was used to transfer our baggage to the dispensary of SCISP (Inter-American Cooperative Service in Public Health), where

Native seringueiro carrying latex from hevea rubber trees to a shed where he will smoke it or coagulate it with acid

headquarters were established. The buildings in the town were well laid out but there were no streets. The spaces between the neat rows of houses and stores were used for grazing. Fences along the sidewalks kept the cattle from entering the doors, although the one in front of the dispensary failed to prevent a donkey putting his head through the window screen of the room in which I and five of my associates slept in hammocks. His unexpected braying in the middle of the night was an uncanny experience which I did not appreciate.

The merchants of Riberaltá are Japanese and to my surprise I found





Some hevea rubber trees are 4 to 5 ft. in diameter and 100 years old

that their shelves were stocked with merchandise from the good old U.S.A.

October 20: We had our first experience with the jungle today. After breakfast we boarded the PBY and flew for an hour over jungle country, landing on the Rio Madre do Dros for what was probably the first visit of an airplane to this area. Crawling on hands and knees through the nose of the plane we got out and onto the river bank, and began a three-mile expedition through the jungle to see rubber collected from the hevea trees that average about one to an acre. This jungle is one of the wildest, least frequented, and altogether most disagreeable areas on the face of the earth. Solid walls of trees, heavy with foliage, and made almost impenetrable by densely matted undergrowth bar the way to man unless he slashes a path with a heavy machete. Luxuriant vegetation with many brilliant colored flowers is everywhere. Everywhere, too, is heat—a heavy, humid heat that rises steaming from the forest floor and clamps down sickeningly from above, as one writer has well described it. The jungle literally swarms with in-

sects and wild life, although to my surprise there are few snakes. Monkeys remain in the interior because the natives like their sweet meat.

Finally we reached the Conquisto Central of Carlos Seiller, one of the two largest rubber producers in Bolivia. This central has the reputation of producing the finest rubber in the Amazon. Some of the wild rubber trees in his 70,000 acres of jungle are said to be 100 years old and are 4 to 5 ft. in diameter. The large trees are given 4 or 5

which it can start its final journey to the United States.

While we were at the central a tropical rain came down for an hour and served to make the return trek to the airplane on the river anything but pleasant. The plane proved to be held fast; one of its pontoons was stuck in the mud bank. For three-quarters of an hour between 20 and 25 Indians swam around in the swift current of the river before they were able with assistance from the crew to free it so that we could return to Riberalta.

The lighting system in this town like that in much of the interior of Bolivia

and Brazil was limited. These countries must depend on wood for fuel and wood is scarce due to poor transportation. Some of the towns use gasogenic engines. The current is irregular, is turned on at 7 P.M. and off at 10 or 11 until the following evening. But perhaps that isn't so bad for only a group of newspaper men would want to remain up in Riberalta after those hours.

Also back in the interior of these countries the food situation is not too good. A few days before our arrival several hundred pounds of sugar had been flown into town. It resulted in a near-riot. Coffee too is difficult to obtain. The natives depend for meat upon xarque (dried beef). Between 8,000 and 10,000 tons of foodstuffs must be brought into the Amazon Valley each month.

October 21: An early breakfast consisting of xarque cooked with bananas, mandioea bread, and coffee with a strong lemon flavor was eaten; and we boarded a launch belonging to SCISP. An early start was necessary to assure arrival at Cachuela Esperanza before dark. Rapids in the Rio Beni at that point make night travel dangerous. The trip down the river was between banks covered with jungle growth, ferns, palms, kapok, rubber and Brazil nut trees, the latter the King of the jungles, vines, orchids, and a great variety of other plants. Macaws, parrots and numerous other brilliantly colored birds frightened by the noise of our gasoline engine flew overhead.

At noon we went ashore at the house of a seringueiro to see the rubber trees that he was tapping. He and his family, chickens and pigs live in thatched roof buildings on the bank high above the river and many miles from their nearest neighbor. The balls of rubber that he makes from the latex are taken up the river in dugouts to points



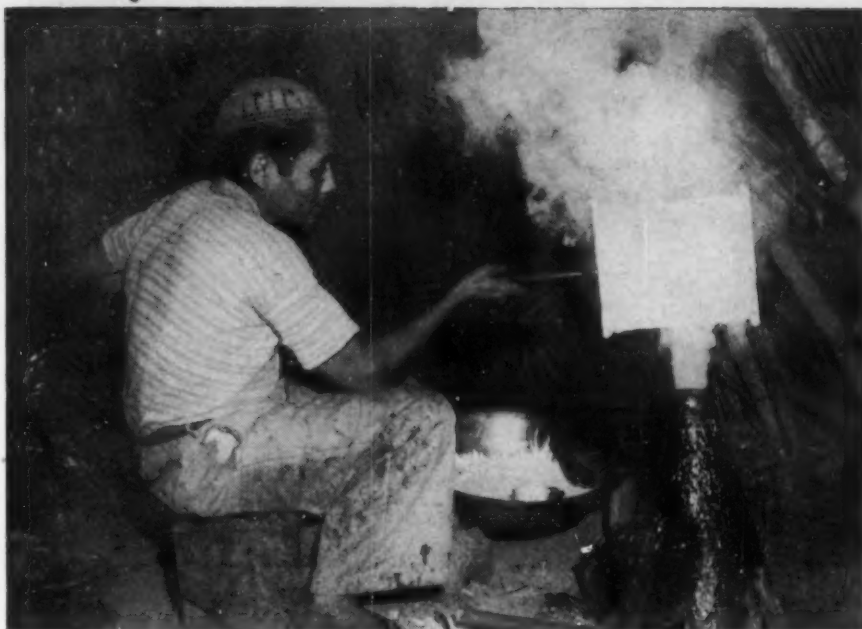
Latex is converted into 110 lb. rubber balls and shipped by river boats to Belem, Brazil

where they are picked up by large river boats for shipment to Belem.

Just before nightfall our boats approached the rapids in the river at Cachuela Esperanza and we disembarked. We were not expected until the following day but arrangements were made to put us in the Suarez home for the night. Hammocks and mosquito netting were hung and our baggage brought up from the boats.

Again we encountered the lack of foodstuffs in these interior regions. The only food on the little boat during the entire day was a piece of meat belonging to one of the crew and which he cooked and ate. Our only water was the muddy stream through which the boat plied. While it was not particularly appetizing it apparently did us no harm. With an appetite and thirst thus built up we sought food on landing and when the shelf of canned food in the little hotel was sighted we gladly paid a dollar a can for sardines, tomatoes, or peaches, a dollar and a half for a jar of pickles, and a dollar a bottle for beer. We had learned a bitter lesson so some of these provisions were kept for the next day. And well they were kept for on the following day luncheon was not mentioned by our RDC hosts.

October 22: After a good breakfast



This Indian covers the flat board with latex from the pan and then holds it in the smoke to cure the rubber

following a night spent fighting malaria mosquitos we departed in a station wagon and truck over an extremely narrow rough road through the jungle for Guayanamerin, a predominantly German settlement. Our planes had rejoined us here and after a short visit with Dr. Lambert to SCIP's dispensary and hospital we were off again. I took my place in the

Lockheed Electra and flew over beautiful lake country to the town of Trinidad, where we were met by the RDC representative who had a truck at the airport in which he proposed to show our group around the town. However, no one could be persuaded to take the ride. Here was the best looking airport we had seen in South America. It had been the property of Lloyd Aero Boliviano, a German company, but is now controlled by Brazilians and operated by a North American. After refueling our plane began a rapid climb in order to go over the Andes at 19,000 ft. into the bowl in the mountains in which the city of

A seringueiro making a ball of rubber on a pole of monkey wood which can be withdrawn at any time

Cochabamba is situated at an altitude of 8,500 ft. After crossing the mountains the Lockheed circled around and around the bowl while the pilot and radio operator worked feverishly trying first to lower the landing gear by the hydraulic control and later by manual operation. It looked as though a "belly" landing would have to be attempted, the only thrill in the 13,000 miles of flying. However, their efforts were rewarded after an hour and a normal landing was made.

Cochabamba is the headquarters for RDC's Bolivian operations. It is expected that approximately 4,000 tons of rubber will be produced in this country in the present year and more in the next. Due to difficulties in transportation on the rivers and over the extremely limited railroad facilities, six to eight months are required to send the rubber to Belem.

October 24: Back into the PBV and we were off to Corumba, a city of 25,000 population on the Brazilian side of the Rio Paraguay. The mayor very graciously met our airplane on arrival at the German built airport and invited the party to be his guests at the moving picture theatre that evening. Fortunately, two of my associates were polite. So we remained in Corumba for the afternoon and night.

October 25: A rap on the door of our room at 3:30 A.M. brought the end to a sleepless night caused by some sort of celebration downstairs. A quick breakfast and we were off again just as the first rays of light appeared in the East. During much of the morning our plane was over hilly country which was covered with many vast coffee plantations.

A large delegation met us at the Congoulas Airport of Sao Paulo.





Gasogenios (charcoal burning automobiles) were everywhere. There are so many manufacturers that no two units look alike

A reception at the *Palacio dos Campas Eleseos* given by the inventor was followed by an interview by reporters of the local newspapers. A reception at the residence of Cecil P. Cross, consul general, gave us an opportunity to meet many of the North Americans who are in business in Sao Paulo. A visit to the headquarters of the Department of Press and Propaganda where we were shown moving pictures until our appetites finally got the better of our manners concluded the day's program. And so to dinner at 11 P.M.

October 26: The first visit was to the Orion plant to see how mangabeira latex is converted into hose, gloves and other dipped mechanical rubber goods. Most of these products are sold only in South America.

The Goodyear plant built in 1939 and the Firestone plant in 1940 are making inner tubes and tires. Both are

extremely modern plants, far more so than any I have seen in the United States. They were designed for straightline flow of materials, and are equipped with the newest of banbury mixers and other machinery. I was told that Goodyear found caustic and acid difficult to obtain for reclaiming and so grinds the old scrap, passes it through three sieves to remove the cotton (which is sold), then treats with hot oil to soften the rubber.

October 27: I am convinced that this custom of serving breakfast in the bedroom is great. However, I wish the management would add ham and eggs to the menu.

The Sao Paulo Railroad is using cottonseed oil in diesel engines. The results are so satisfactory that it is planned to continue the use of this oil after the war.

The state of Sao Paulo's Service de Sericicultura has been doing much to encourage the production of natural silk. It distributes, without charge, mulberry slips and silkworm eggs to the farmers. It also trains technicians in sericulture and gives technical aid to the industry. The production of raw silk this year is expected to reach 300,000 lb. and at the present rate of growth it should be 1,000,000 lb. in two years. With the proper training and classification there is no

President Vargas of Brazil (with glasses) received our party at the Guanabara Palace

reason why Brazil cannot produce a good grade of silk, in large enough quantities and at a price to be of interest to the United States silk industry.

Sao Paulo owes its vast industrial development to great hydroelectric projects. By 1938 Brazil had 1,200 installations with a potential capacity of more than 1,100 kw. Of that total, Sao Paulo has more than 60 percent. The Federal District figures second with 174,115 kw. and Minas Geraes third, with 110,000 kw. The great works in the Serra do Mar (Cubatão) now takes eighth place among the world's largest installations as regards generating capacity, with a possibility of occupying third place when the developments already planned have been completed.

Production of dehydrated foods in the state of Sao Paulo is increasing rapidly. Such names as Swift, Armour and Wilson are prominent in the industry. At present the products include beef, vegetables, bananas, milk, eggs and soups. Lard and butter are in the experimental stage.

Today we were luncheon guests of the American Chamber of Commerce at the Jockey Club. Afterwards we hurried to the airport for a flight to Rio de Janeiro. Arriving a couple of hours later, the PBY circled over the harbor with its famous Sugar Loaf Mountain and 364 other islands, and the city built around numerous hills. It is a beautiful sight from the air.

October 28: This was the first opportunity I have had to relax. A continental breakfast in the bedroom, a few letters written and I went down town for a short look around.

Luncheon was at the Restaurant *Praia Vermelha*, a beautiful place near the base of Sugar Loaf, where our host was His Excellency, Dr. Souza Costa, Minister of Finance and president of the Commission for the Control of the Washington Agreements. Then there was a reception and visit to the Department of Press and Propaganda at the *Palacio Tiradentes*. And at 6:30 we taxied to the recently completed, very palatial American embassy where a reception was given by His Excellency the Honorable Jefferson Caffrey. After a simple dinner at the Gloria I retired early for the first time in Brazil.

October 29: President Getulio Vargas received the party at the Guanabara Palace, the private residence of His Excellency. This palace which stands in the middle of a lovely park, was formerly the property of the Brazilian Imperial House. Later we were the guests for dinner at the Capaebana Casino.



October 30: We were given a rest this morning by the schedule makers and so I used this opportunity to call on the U. S. Purchasing Commission for the purpose of discussing the vegetable oil and wax situation in Brazil. The castor seed crop is now almost twice as large as it was in prewar years. In Sao Paulo and other southern states a good start has been made in raising tung oil plants. Some very extensive plantings have been made. This year's production will be about 200 tons. Peanut, babassu, oiticica and other oils are on the increase.

I then got in a taxi and tried to explain by word and liberal use of hands that I wished to be taken to the Pan-American airport where I was scheduled to attend a luncheon. But my Portuguese and the driver's English were inadequate. After another attempt I realized for the first time what it meant to be alone in a country in which I could not speak the language. I gave up my effort on the taxi driver and decided to walk along Avenida Rio Branco, Rio's principal street, until I saw someone who might speak English. I hadn't gone far when I encountered several American sailors. Fortunately, the distance to the airport was not great and so I walked.

While at the airport we had the experience of seeing a Brazilian Navy patrol plane arrive with the scars of battle. The crew had encountered and sunk an enemy submarine.

Gasogenios (charcoal burning automobiles) were everywhere. There are so many manufacturers that no two units look alike. The initial cost ranges from \$300 to \$700. A pound of charcoal is good for one to two miles of driving. The starting operation requires about 10 minutes.

October 31: The schedule planners took a holiday and so did our group. Most of the day was used for sightseeing around Rio. In the morning we rode up Corcovado Mountain which is 2,400 ft. high. On the top is the concrete statue of Christ the Redeemer with arms outstretched as if blessing the city.

November 1: Our rest was over. We were called at 3:45 A.M. A continental breakfast was brought into the room at 4 and the group took off from the airport two hours later in a Lockheed Loadstar and an Electra for Fortaleza.

The view of Guanabara Bay with its 365 islands was beautiful even at that early hour. Our plane followed the coast northward to Bahia where it landed in order to refuel. At 2 P.M. we arrived at Recife intending to remain an hour; however, when we found from the delegation from Vice Admiral Jonas H. Ingram's staff that he

was expecting the party to remain over night the plans were so altered. We met him at Navy headquarters and after a hearty welcome were taken on a tour of the base by Captain Hodgman and other officers.

November 2: Another early call and a real North American breakfast for a change, and we were off again. As trouble had again developed in our small plane we filled the Loadstar, leaving the extra man to follow in another plane.

At 6:45 A.M. we landed at Natal where we were met by Maj. Gen. R. L. Walsh who escorted us on a tour of the airfield and quarters.

On arriving at Fortaleza we were met by representatives of the Coordinator's and RDC's offices, and were taken to see the two types of rubber that grow in this and several adjoining states.

Mangabeira is a small tree rarely more than 25 ft. tall. The rubber from this tree is coagulated by heating the latex in a pan over an open fire. Frequently large quantities of salt or alum are added to hasten coagulation. The rubber elongates greatly before breaking and has a tensile strength below that of the rubber of Amazonas. Mangabeira has been used for many years in Germany and the factories of Sao Paulo.

Manicoba is closely related to mandiocca, which forms the principal food of the inhabitants of a large part of Brazil. Manicoba rubber is "stiffer" than mangabeira or hevea, and breaks before it reaches the percentage of elongation which can be obtained with either of the other two types of rubber.

As we followed the Atlantic Coast northward there were occasional evidences of the havoc that had been played by the war. One or two partly submerged enemy ships could be seen that had been scuttled by their crews, and several of our own that had run aground in their efforts to get away from German undersea craft.

At 5 P.M. we arrived at Belem from which we had started

Sao Paulo is one of the most modern industrial cities on the Western Hemisphere

our trip through Brazil and Bolivia several weeks before. After establishing ourselves at the Grande hotel, a call was made on American Consul McLaughlin to pay our respects.

Nov. 3: While waiting for a plane to take us back to the States we went by boat to see a sugar cane plantation and raw sugar house about 200 years old. Before luncheon we enjoyed the experience of a short swim in the great Amazon.

November 4: Up at 3:30 for an early take-off to Trinidad. We used the same S42 seaplane that brought us to South America, but operated by a different crew. Continuing to follow the coast we flew over French Guiana and several times circled over the Devil's Island group. At Paramaribo, Surinam, we again stopped for refueling. Then we continued the journey to Trinidad flying low over the famous pitch lake to get a look at this natural wonder.

November 5: A knock on the door at 3:30 was followed by a breakfast of dehydrated eggs and coffee. We took off at 5:30 just as the first signs of daylight appeared in the East for our last lap of the airplane trip. We arrived at Miami, having travelled 14 hours and a distance of 1,800 miles, the longest single day's flight of the entire trip. With custom formalities over, we established ourselves in Miami to wait transportation to our respective destinations.

November 9: After an uneventful railroad trip I arrived home.



PLANT NOTEBOOK

HERE'S YOUR CHANCE FOR ANOTHER WAR BOND!

For the best short article received during the months of December 1943, and January 1944, and accepted for publication in *Chem. & Met.*'s "Plant Notebook," a \$25 Series E War Bond will be awarded, in addition to payment at our usual space rate for this department. To be eligible for one of the two awards an article must be received during one of the two months mentioned. The award for each month will be announced in the issue for the following month. The judges will be the editors of *Chem. & Met.* and it is a condition of the contest that any item submitted may be published in this department, but that all items so published will be paid for after publication at our usual rate for such material.

The contest is open to all readers of *Chem. & Met.*, other than employees of the McGraw-Hill Publishing Co., Inc. Any number

of entries, without limit, may be submitted by one person. Articles must be previously unpublished, and should be short, preferably less than 300 words, but should include one or more illustrations if possible. Finished drawings are not required and literary excellence will not be a factor in the judging. Winning articles will be selected on the basis of appropriateness, novelty and usefulness of the ideas described.

Articles may deal with any sort of plant or production "kink" or short-cut which in the opinion of the judges will be interesting to chemical engineers in process industries, as well as with cost reducing ideas, and novel means of presenting useful data. Material to be entered in this contest should be addressed to Plant Notebook Editor, *Chem. & Met.*, 330 West 42nd St., New York, 18, N. Y.

WELDING SAVES TIME IN BUILDING EQUIPMENT

A. F. DAVIS

The Lincoln Electric Co.
Cleveland, Ohio

VERSATILITY of the electric arc welding process for producing all types of essential equipment in record time and at minimum cost was exemplified in a survey made by The Lincoln Electric Co., Cleveland, Ohio, whose engineers reported a steady growth in the use of this modern process throughout all industrial centers.

Typical of several prominent users in the Cleveland area is the Harshaw Chemical Co. of that city where welding is a principal tool in construction and maintenance work.

A number of interesting fabricating jobs at this plant included the construction of a drum dryer (see Fig. 1) made of scrap and salvaged parts and materials. The base was built from 10-in. and 12-in. I beams taken from an old riveted structure. The cover over the drum and

the pan under the drum were formed from a section of 10-ga. iron, all welded at the joints.

The main sprocket, 37 in. in diameter (Fig. 2), is cast iron. The hub, 5 in. long and with an 8-in. outside diameter, is of mild steel and was bored and keyed to fit the drum shaft. A flange, 12 in. in diameter, was fillet welded to the hub and the flange bolted to the web of the cast iron sprocket as shown in Fig. 2. A steam connection to the drum

Fig. 3—The water catch pan on this acid reactor was constructed by welding mild steel



Fig. 1—This drum dryer was fabricated largely by arc welding



Fig. 2—Construction of this sprocket saved 9 weeks' delivery time



is made through the shaft as shown. The entire sprocket was built in one week at slight cost, whereas delivery of a new sprocket would have taken 10 weeks' time.

NOVEMBER WINNER!

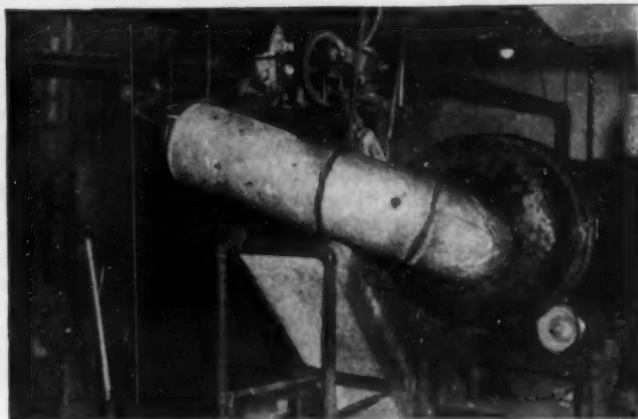
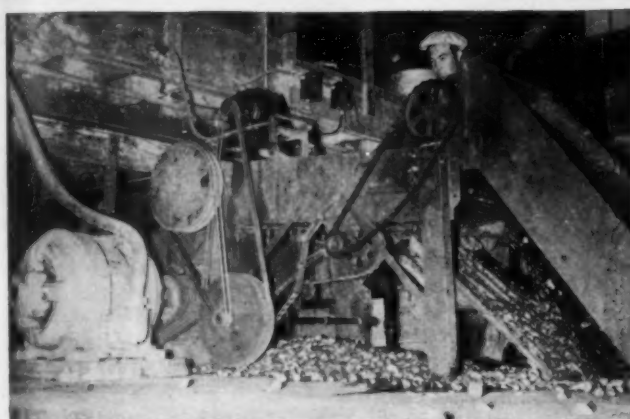
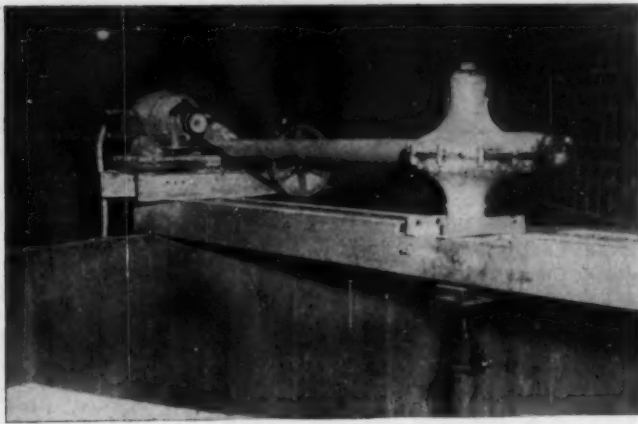
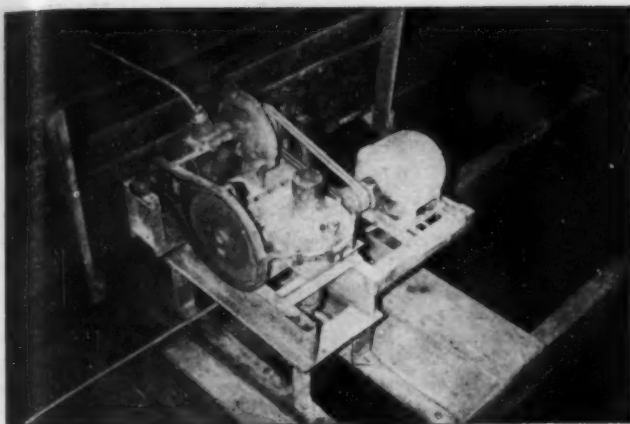
A \$25 Series E War Bond will be issued in the name of

GERALD M. ANDRESS

Supervising Chemist
Defence Industries Ltd.
Valleyfield, Que., Canada

For an article dealing with a simple method for the analysis of three-component plant solutions which has been adjudged the winner of our November contest.

This article will appear in our January issue. Watch for it!



An auto rear end and gear box give a variable-speed drive for this brown starch agitator

An old grain binder and several automobile parts were converted into this potato sorter

This automobile rear end and torque tube make an excellent agitator drive

Two range boilers and various auto parts become important elements of a potato washer

An acid reactor is shown in Fig. 3 with a sleeve drain at the bottom end. The reactor pipe is of copper pipe, 6 in. in diameter, with a wall thickness of $\frac{1}{4}$ in. The structure shown surrounding the pipe in Fig. 3 is constructed of mild steel welded to form a circular pan for catching water that has been sprayed over the tower for cooling purposes.

Harshaw officials report that the arc welding process is saving time, money and valuable materials.

STARCH PLANTS IMPROVISED FROM AUTO PARTS

HENRY W. YOUNG
Portland, Ore.

AS A RESULT of a survey conducted by Idaho Farm Chemurgic Committee, looking toward the formation of new industries in the state, three potato starch refineries have recently gone into operation at Twin Falls, Blackfoot and at St. Anthony, Idaho. The three plants are now producing starch at the rate of 30 carloads every three months.

Two of the plants have operated for two years, the third for one, long enough to show their success, despite the improvisation that was necessary in their construction. As soon as construction was started priorities and scarcity difficulties were promptly encountered. Had it not been for the automobile junk yards,

and for a sugar-beet factory which was about to be dismantled some 600 miles away in southern Utah, it is probable that the plants could not have been built until after the War. Fortunately, many parts of the sugar factory were adaptable to the conversion of potatoes to starch, but there was still the problem of gears for the centrifugal extractors and many pieces of auxiliary equipment. The accompanying views show some of the ingenious adaptations that were made, particularly with automobile change-gear sets and rear end units.

ELECTRICAL ANALYZER (Continued from page 113)

has been applied to the study of efficiency and heat flow in open hearth regenerators; to the investigation of thermal phenomena in the wheel and brake of a locomotive during emergency braking; to the heat losses in pipe insulation with both steady and intermittent heating. It has been used to investigate the changes in cooling load inside buildings subjected to varying sun load and wind conditions, with walls of different characters; to determine the cooling rate in arc welding; and the temperature distribution in suddenly heated material.

It has been applied in studying the flow of heat through gases and liquids as well as solids; and in determining the influence of film resistance and design factors in heat exchangers. In addition to use in problems dealing with the unsteady state, it has proved of value in complex steady-state problems, such as determining the influence of mortar joints and through metal on the temperature distribution and the heat losses in insulation.

Some of the other problems for which the analyzer seems applicable are the study of heat application in aluminum electrolytic pots, glass tanks, glass annealing furnaces, cement and ceramic kilns, and coke ovens. Another broad class of applications, as yet untouched, is in the study of fluid flow, mass transfer and diffusion. Although experience with such applications is lacking, it is clear that the use of the analyzer should be equally as suitable as for heat flow study, since the equations, like those for heat, are identical in form with those governing the flow of electricity in the analyzer circuit.

For a new idea in nomographic charts—charts printed in two colors—please turn to page 142.

PROCESS EQUIPMENT NEWS

LATEX PUMP

To OVERCOME the physical tendency of natural and synthetic latex to coagulate during pumping, due to the centrifugal agitation, turbulence or rubbing, performance of many types of pumps has been investigated by T. Shriver & Co., Harrison, N. J. A diaphragm pump, meeting satisfactory performance requirements, has been announced as a standard unit for use in synthetic rubber plants. These pumps are now in operation in butadiene-styrene copolymer plants to move the latex from the flash tanks to styrene recovery towers and thence to pump it into blending vats.

The desired results are attained by an activating mechanism which does not come into contact with the fluid being pumped, but it is separated from it by rubber diaphragms. This seals off the piston proper from the liquid ends, without the use of packing which might permit air leakage, so that the presence of air in the liquid is eliminated.

The liquid ends of the pump completely fill at each stroke as a result of action of the centrally located piston against the diaphragms. The latex enters and leaves the cylinders without turbulence or aeration, with only a minimum rubbing action at intake or outlet ball valves. Friction is minimized by coating all working parts with resin enamel, to reduce the tendency toward coagulation and deposition. Since some coagulation takes place, of course, the pump is designed for maximum ease of cleaning.

FUEL-SAVING DAMPER

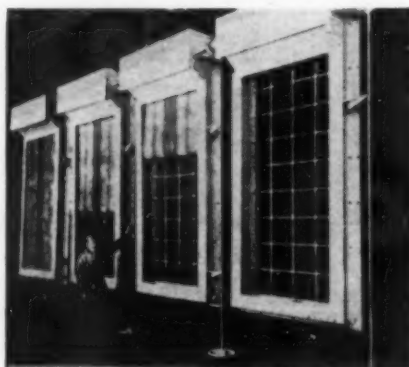
RECENT INFORMATION from England describes the savings possible with an asbestos curtain damper known as the Heaton which is being marketed in the United States by the Thermix Engineering Co., Greenwich, Conn. The damper, which is shown open, closed and in two intermediate positions in an accompanying illustration, employs an asbestos sheet which in the open position is wound on

a roller by means of a suitable winding gear. The winding mechanism is actuated either manually or by means of a motorized reducer. A second roller at the bottom of the curtain pulls the asbestos sheet down on closing, over seals located around the periphery of the duct. The purpose of the damper is to shut off a boiler, or complete boiler plant, which is temporarily closed down, producing a tighter seal than is generally possible with dampers of other types and thus materially reducing air circulation through the boiler and up the stack during the down periods. In a typical case quoted, a boiler having a normal evaporation rate of 40,000 lb. per hour usually operates 12 to 14 hours per day at 200 lb. per sq. in. with a steam temperature of 670 deg. F. Since the installation of a Heaton damper in May 1940, there has been a reduction of about 300 lb. per hour of coal consumed during the down period, with a loss in steam pressure of only 70 to 80 lb. per sq. in. The banking loss thus saved amounts to about 4 percent of total coal previously burned per 24 hour period.

THREE-TON TRUCK

CONVENIENCE of operation is featured in the new type E-3 6,000-lb.-capacity, low-lift truck which has recently been announced by the Baker Industrial Truck Division of The Baker-Raulang Co., 2168 West 25th St., Cleveland 13, Ohio. This is a heavy-duty elevating platform truck

Asbestos curtain damper for boilers



6,000-lb. low-lift truck



which is totally inclosed, with the controls conveniently grouped. Steering operates on all four wheels and is actuated by a horizontal tiller handle. The truck is designed for operation in intersecting aisles 67 in. wide. It has a platform 26 1/2 in. wide by 54 in. long. The platform height is 11 in. in the low position and the vertical lift, 6 in. The battery compartment has been increased in size to provide additional battery capacity. The lift is hydraulic and the lowering, by gravity, is controlled by the same lever which controls the lift.

EVAPORATIVE AFTERCOOLER

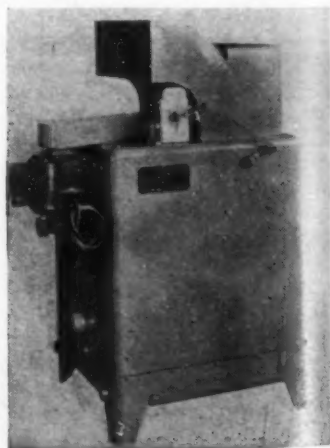
TEMPERATURES within 10 deg. of the wet bulb temperature of the cooling air are said to be attainable with a new evaporative aftercooler for air and gas compressors which has recently been introduced by the Niagara Blower Co., 6 East 45th St., New York 17, N. Y. This new application of the evaporative cooling principle, on which patents are pending, draws air by means of a fan through a water spray across coils through which the compressed gas flows. This arrangement is said to permit the attainment of temperatures 10 to 20 deg. cooler than with conventional coolers, producing compressed gas or air which contains only one-half to three-fourths as much water as gas cooled by conventional methods.

HYDROGEN PURIFIER

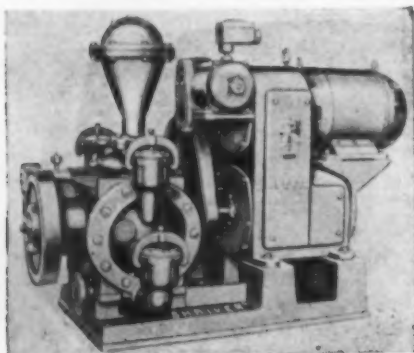
REMOVAL of residual oxygen, moisture and other active contaminating gases from commercial hydrogen is the function of a new electric hydrogen gas purifying device recently developed by Eisler Engineering Co., Newark 3, N. J. Hydrogen so purified is suitable for use in edible oil purification, welding and brazing, and similar applications. The purifier is shown in an accompanying illustration.

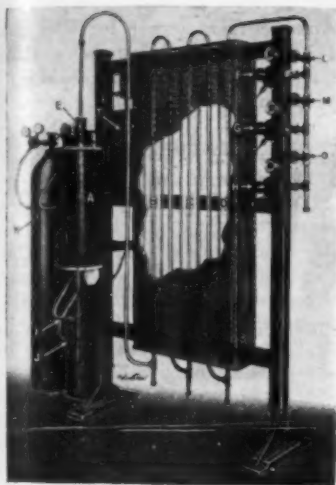
The hydrogen gas to be purified, under a pressure of 30 to 50 lb., passes first

Niagara Aero aftercooler



Pumps for synthetic latex





New hydrogen gas purifier

through an electrically heated furnace A, in which is a calorized seamless steel tube B, containing small pieces of pure copper for removing the oxygen. The gas then moves progressively through three glass containers, B, C, and D, which are filled with purifying ingredients such as caustic potash or soda lime. From the last tube the gas enters a manifold with outlets L, M and O. From these it passes to the point of use. Each outlet is controlled by an adjustable diaphragm reducing valve F, G and H, providing a possible reduction of pressure down to $\frac{1}{2}$ lb. per sq. in.

The oven A operates on 110 to 220 volts, the temperature being regulated by an auto transformer T. Best results are reported at 980 deg. F.

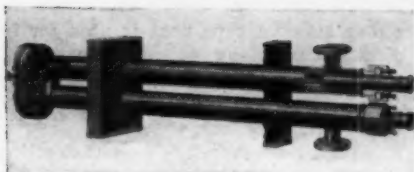
BOILER LEVEL CONTROL

MAINTENANCE of constant boiler water level is the function of the new Fireye electronic feedwater control, series P156N, recently announced by Combustion Control Corp., 77 Broadway, Cambridge 42, Mass. The device employs three probes which mark the feed-water-pump on-and-off levels and a low-water danger mark. The top and middle probes determine the high and low levels while the lowest probe defines the danger point below which the equipment immediately shuts off the fuel and sounds an alarm.

SECTIONAL HEAT EXCHANGER

AN IMPROVED construction of the "sectional hairpin" type heat exchanger, said to offer many advantages never before available in exchangers of this sort, has been announced by The Brown Fintube Co., Elyria, Ohio. One of the features of the new exchanger is a simplified rear-end assembly which facilitates removal of the hairpin unit. It is only necessary to remove the bolts of the cover plate at the left end in the accompanying illustration, back the plate off far enough to clear the plates of adjacent sections, swing the plate through 180 deg. on a permanently attached swing bolt, and re-bolt it in position. This gives a clear, unobstructed entrance into the exchanger.

Another new feature is the new head seal shown at the right end of the view.



BFT-1 hairpin exchanger section



New Revolute 8Q printer

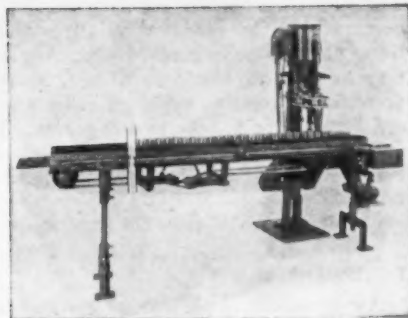
A seating surface is permanently welded to the tube. A gasket and solid ring are then put over the seating ring, followed by two split collars containing cap screws which can be assembled with a conventional 8-in. crescent wrench. Tests using a solid copper gasket are said to have shown this construction capable of holding in excess of 2,000 lb. pressure for long periods without "weeping." In addition to facilitating cleaning and repairs, the new construction simplifies interchanging various types of extended surface tubing to permit the unit to be changed over quickly for optimum operation in different duties.

PRINT MAKER

DESIGNED for use by concerns having medium production requirements and desiring a fast, compact, easy-to-operate printer, the new Revolute 8Q printer has been announced by the Paragon-Revolute Corp., 77 South Ave., Rochester, N. Y. The new printer exposes blueprints, direct process prints, and sepia negatives up to 54 in. in width and is claimed to do so without static or slippage and without chalking tracings. It speed ranges from 6 in. to 32 lin. ft. per minute, and it is available in widths of 42 and 54 in. As in all machines produced by this manufacturer, the 8Q employs a revolving Pyrex glass cylinder against which the tracing and sensitized materials are firmly held during exposure. A quartz high-pressure mercury-vapor lamp, drawing approximately 75 watts per lin. in. and having a guaranteed operating life of 1,000 hours, is used to assure fast, economical printing. The machine is simple in design and can be operated by inexperienced help, according to the manufacturer.

AUTOMATIC CONTAINER FILLER

FOR DRY-products-container filling, the Triangle Package Machinery Co., 906 North Spaulding Ave., Chicago, Ill., has



Improved container filler

on the market a new automatic machine with a special automatic two-way conveyor which returns the filled containers to the operator. It is designed for production setups where it is desirable for the intake of empty, and the delivery of filled, containers to be at the same point, to allow a single operator to handle the entire output. A no-container, no-fill control prevents discharge when the container supply is exhausted. The filler is built in size ranges capable of handling from 1 oz. to 24 oz. Production is from 40 to 60 containers per minute, according to the manufacturer.

UNIVERSAL pH INDICATOR

ABILITY to give direct readings with glass, hydrogen and quinhydrone electrodes is a feature of a new portable universal pH indicator which has been introduced by the Leeds & Northrup Co., 4934 Stenton Ave., Philadelphia 44, Pa. The instrument employs self-contained electrodes of new and improved design. It is compactly housed in a light-weight carrying case and is said to be easily accessible because of the removable lid and hinged end of the case. For measuring pH of samples between 20 and 40 ml., a standard 50 ml. beaker is used. For samples of approximately 2 ml., a small-sample holder is provided. In either case, measurements can be made without removing electrodes from the compartment. Because the electrode holder moves up and down on a hexagonal rod, it can be raised easily to facilitate removal of the beaker or holder containing the test solution. For external pH measurement and for titrations, 15-in. leads permit the electrodes to be used outside the case.

GLOSS METER

FOR THE measurement of gloss of plane surfaces of materials, such as paint finishes, enamels, lacquers, metals, wood, paper, plastics and glass, anywhere in the range from zero to 100 percent gloss, the American Instrument Co., 8010 Georgia Ave., Silver Spring, Md., announces the new Aminco-Scott Goniophotometer. The instrument measures specular gloss, contrast gloss, distinctness-of-image gloss, absence-of-bloom gloss and other optical properties of surfaces of all kinds. It is said to be especially useful for the A.S.T.M. method D523 for measuring specular gloss of paint finishes.

The illumination is adjustable from minus 30 deg. to plus 70 deg. from the

normal and the receptor is adjustable from plus 30 to minus 70 deg. Angles may be read to 1 minute of arc. Measurements of relative apparent reflectance can be made from zero to 100 percent in steps of 0.01 percent. A complete gloss curve of a high gloss sample can be obtained in approximately 30 minutes. The instrument operates from the light socket.

EQUIPMENT BRIEFS

AN IMPROVED dry chemical for use in fire extinguishers developed by the Du-Gas Engineering Corp., Marinette, Wis., has been designated Plus-Fifty DuGas Dry Chemical. The improved chemical hangs over the fire area in a heavy cloud, has water repellancy, is non-caking and non-corrosive and has non-toxic properties. It is non-conductive to electricity and thus can be used on fires in live electrical equipment.

Now available for civilian consumption, Merix anti-fog compound MCG is being announced by the Merix Photo Co., Wrigley Bldg., Chicago, Ill. The compound has cleansing properties, combined with a powerful but harmless anti-fogging agent, for use on glass and plastic materials. It is non-flammable and non-acid. It is applied to the article, allowed to dry and then polished until perfectly clear, remaining effective until it is wet-wiped or washed.

AS THE EFFORTS to produce penicillin on a factory scale are swinging into high gear, two stages at least of the process have been adapted to large-scale production methods. Separation of the crude penicillin from an acidulated solution must be accomplished quickly, a step which is reported to be carried out in Super-Centrifuges manufactured by the Sharples Corp., Philadelphia. When the penicillin extract is finally ready for dehydration, one of the largest plants will use high vacuum dehydration, employing large-capacity diffusion pumps and a process developed by National Research Corp., Boston. Heat cannot be used for this purpose and the freezing methods of vacuum dehydration formerly used were slow in action. The new process is expected to cut dehydration cost to one-sixth, reducing the dehydration time from 20-40 hours to as low as 6 hours. The new process employs pressures of less than 0.0001 atm., made possible by high vacuum pumps of enormous capacity. Water is continuously removed from the pumping system by means of a rotary condenser which forms ice at extremely low temperature. The new dehydration process is being offered royalty-free for the duration.

LEVEL CONTROL PILOT

DEVELOPED to meet requirements for a level control pilot having a very wide throttling range, the new Type 1400 level control pilot has recently been announced by Hanlon-Waters, Inc., National Bank of Tulsa Building, Tulsa, Okla. The new pilot is intended for indicating or recording level service where

a displacement type float is used for indicating positions of level in vessels where the use of gage glasses is impossible. According to the manufacturer, wide throttling range settings are important for even-flow characteristics where surge impulse elimination is necessary to raise efficiency and make for better control of the system. If on-and-off action of the control is desired, this can be secured by adjustment without additional parts or special tools. The pilot has a specific gravity index scale setting from 0.1 to 2.0, with a throttling range adjustment from zero to 300 percent and ability to set in exact relation to the specific gravity setting. In the accompanying view the gravity scale is indicated at 1, the throttling range adjustment at 2, the adjustment for height of level control at 6.

ARC WELDER

DEVELOPMENT of both manual and automatic arc-welders designed for welding magnesium, magnesium alloys, aluminum and other high-strength light alloys under a protective shield of helium gas, has been announced by General Electric Co., Schenectady, N. Y. The new equipment is based on laboratory research which revealed some time ago that fusion welding was possible in atmospheres of helium and argon, using tungsten and carbon electrodes.

Completely automatic equipment now in use is said to make a clean weld at rates up to 40 in. per. minute on $\frac{1}{8}$ -in. stock. Incorporating a new electronic motor control, the equipment holds the proper arc length even while the arc climbs and descends inclines. The tungsten electrode used to start and maintain the arc extends through the center of the rod, perpendicular to the work, while the helium is fed in around it. The filler-metal feed rate can be adjusted to be constant and uniform, or a supplementary control will feed, withdraw, and feed the wire again, as determined by a predetermined cycle.

For manual welding a specially designed electrode holder is provided for either a tungsten or a carbon electrode. This conducts the welding current to the electrode and surrounds the electrode with a stream of helium gas. The source

of direct-current power for both manual and automatic welding is a standard G. E. direct-current arc-welding machine.

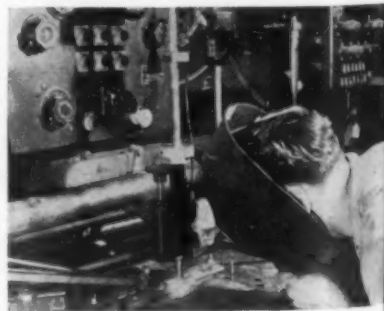
LIFT TRUCK BACKREST

TO FACILITATE the handling of higher stacks of bags, drums, bales, boxes or other small-unit bulky loads which normally would extend above the top of lifting carriage backrests on standard lift trucks, a carriage backrest extension has been developed by the Towmotor Corp., 1226 East 152d St., Cleveland, Ohio. The new backrest extension provides increased support and minimizes the possibility of shifting while high loads are being lifted, moved or stacked. It is of all-welded steel construction and is quickly attached to the truck by welding sockets on to the standard lifting carriage as indicated in the accompanying illustration. The extension is removed merely by slipping its pins from the sockets.

FLOOR PATCHING MATERIAL

REPAIR of concrete and cement floors is the function of Emery-Crete, a new development of the Walter Maguire Co., 330 West 42d St., New York 18, N. Y. This material is intended primarily for use in filling cracks, small depressions, ruts and other imperfections and inequalities. The material is ready-mixed and can be applied immediately after water has been added. It is composed of small particles of emery mixed with a special quick setting binder which permits use of the floor in six or seven hours after the repair has been made. The material is available in small packages so that large quantities need not be ordered for small repair jobs. The material is claimed not to shrink and to have high adhesion, giving permanent repairs, according to the manufacturer.

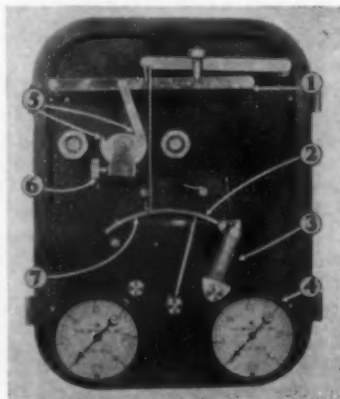
Helium-shielded welder in operation



Backrest extension on lift truck



New level control pilot





The Committee of Award for Chemical Engineering Achievement voted unanimously to present the 1943 award to the American Synthetic Rubber Industry.

THE GIRDLER CORPORATION WISHES
TO EXPRESS ITS APPRECIATION
OF THE RECOGNITION ACCORDED
IT AS ONE OF THE PROCESS
ENGINEERING COMPANIES HONORED
FOR THEIR CONTRIBUTION TO
THE SYNTHETIC RUBBER PROGRAM

THE GIRDLER CORPORATION • GAS PROCESSES DIVISION
LOUISVILLE • KENTUCKY

Engineering Contractors for Chemical and Petroleum Process Plants

AVIATION GASOLINE

WITH THE TREMENDOUS GROWTH that has taken place in aviation during the war, high octane gasoline has correspondingly grown in importance. The fluid catalyst cracking process developed by the Standard Oil Co. (N. J.) makes it possible to supply the needed quantities of 100 octane gasoline without requiring that petroleum production be augmented to an excessive degree, and thus assists in conserving the country's petroleum resources. By combining alkylation with the fluid catalyst process additional quantities of 100 octane gasoline are produced helping further to hold petroleum production down to normal level.

The fluid catalyst cracking process employs an aerated powdered catalyst. In vertical standpipes, the fluidized catalyst develops a pressure-head as would a column of water, and the fluidized catalyst can be circulated through the cracking unit in the same way as a fluid.

The cracking process consists in bringing a vaporized gas oil fraction in contact with the catalyst in a reactor under conditions to give the desired degree of cracking. In the course of the cracking there are produced gaseous products, light naphthas, a gasoline fraction, heavy fractions suitable for use as fuel oils and some carbonaceous material. Separation of the catalyst from the products of cracking is carried out by means of cyclone separators. The products are then fractionated and the gasoline fraction, possessing a high octane rating, is used as a base stock for the production of 100 octane gasoline.

Alkylation yields additional amounts of 100 octane gasoline by conversions of some of the gaseous products formed in the cracking step. In the alkylation process olefins and iso-paraffins are reacted with each other in the presence of a catalyst such as sulphuric acid. Ordinarily butenes and isobutane are inter-reacted, giving branched octanes of high octane rating. A fraction of the mixed octanes, boiling within a specified temperature range, is added to the cracked gasoline base as a blending agent, known as aviation alkylate, to increase the volume and octane rating of the gasoline.

The finished aviation gasoline consists of the cracked gasoline base, alkylate, isopentane added to adjust volatility, possibly other blending agents to impart special properties, lead tetraethyl, an oxidation inhibitor and a dye. The composition of the gasoline may be varied according to the use to which it is to be put, and the cracking process modified according to the type of gasoline desired.

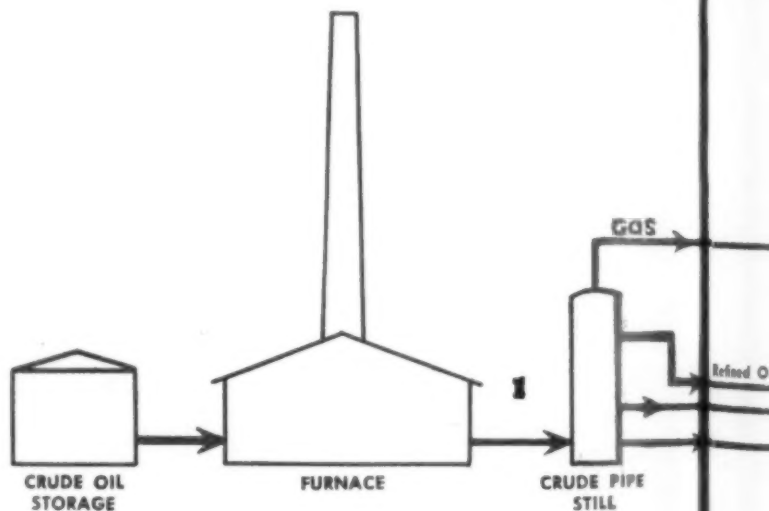
CHEMICAL & METALLURGICAL
ENGINEERING

December, 1945

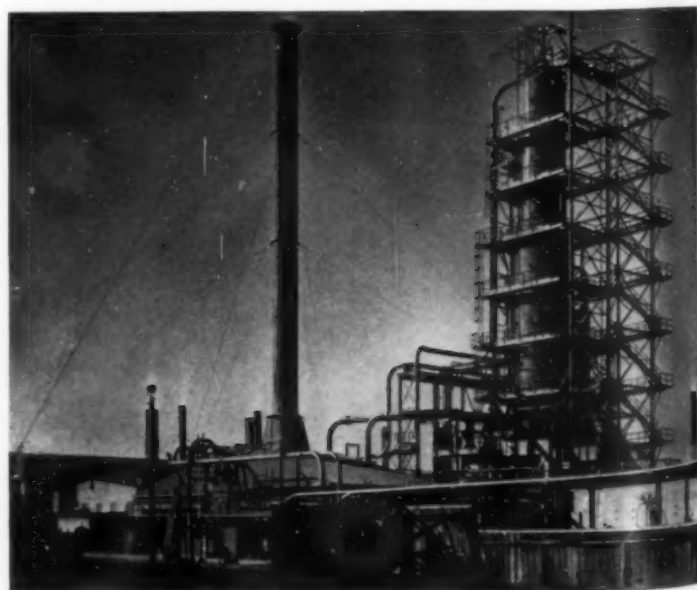
PAGES 130 to 133

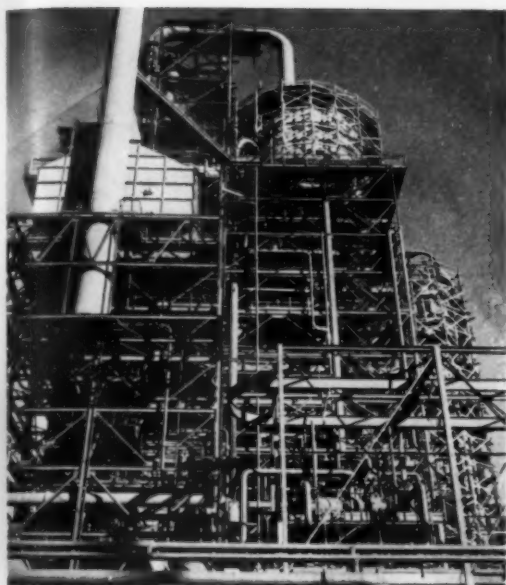


2 Into these hoppers is fed the catalyst which controls cracking of the petroleum

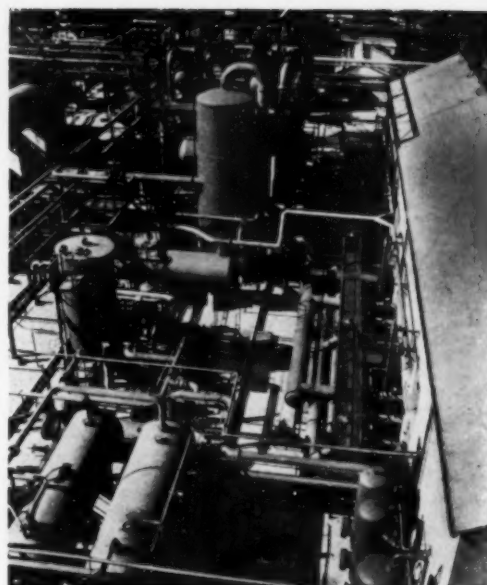


1 Crude oil to be processed is distilled into various components in a pipe still, and products collected for further processing

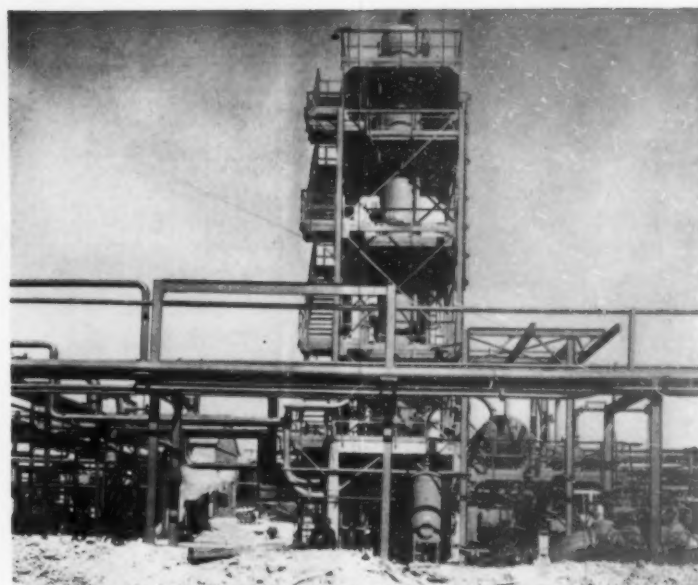




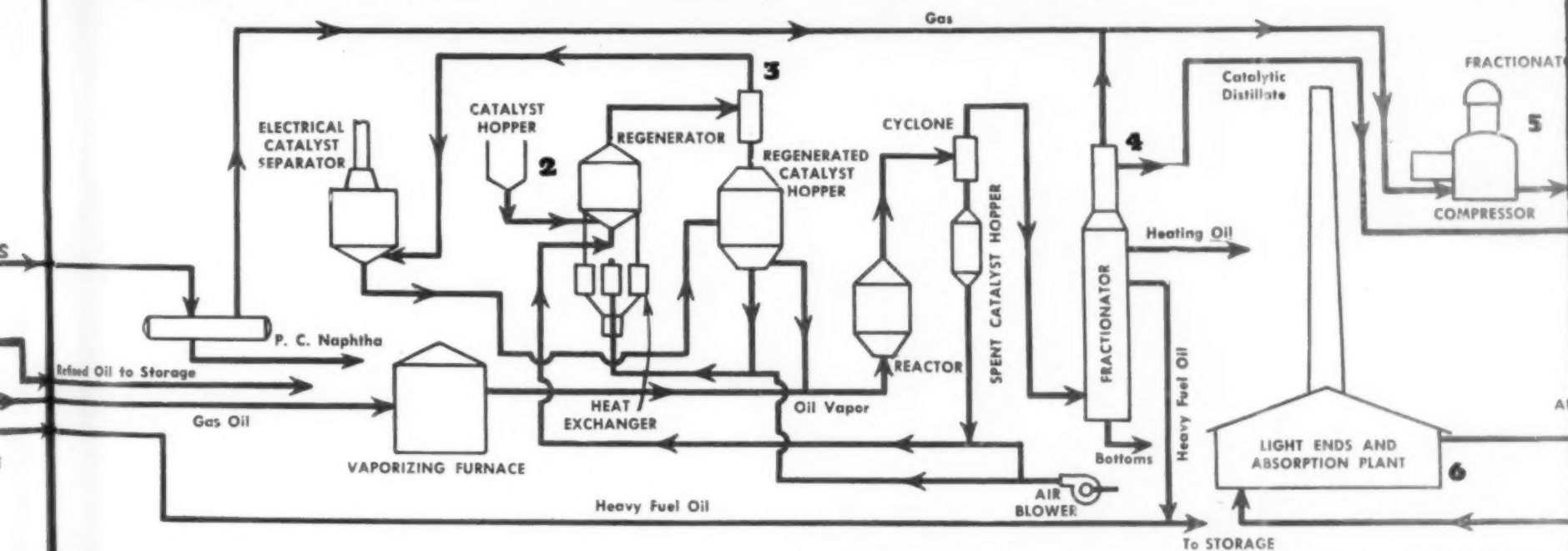
3 Gas oil distillate in fluid catalyst cracking plant is converted to high octane gasoline stock



5 Gaseous products are compressed and separated into components for use as fuel, etc.



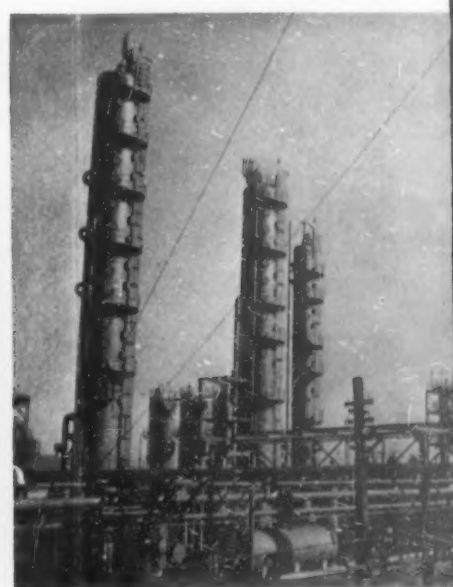
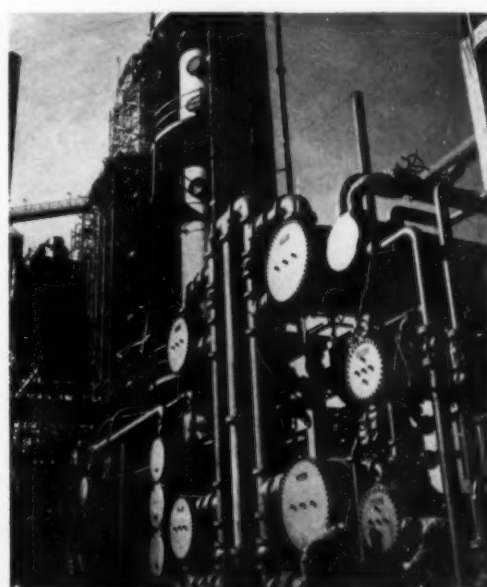
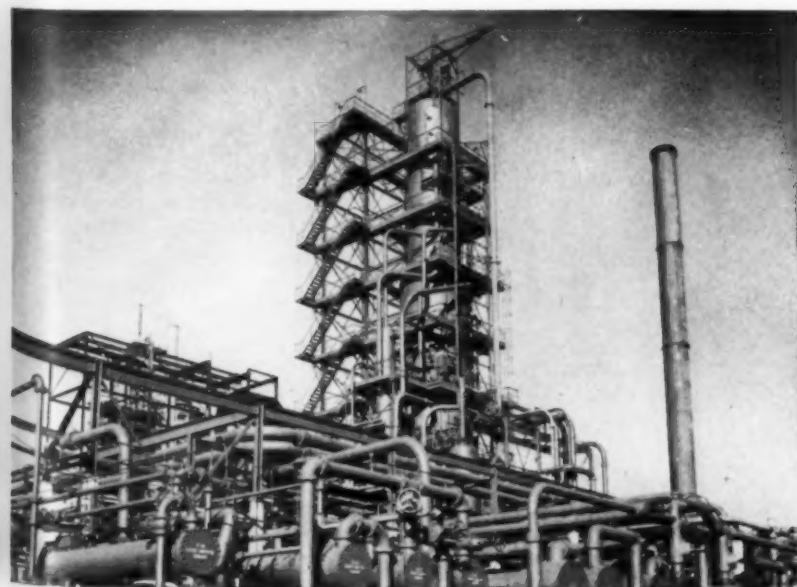
8 Gaseous products are further purified by treatment at the gas scrubber plant shown here

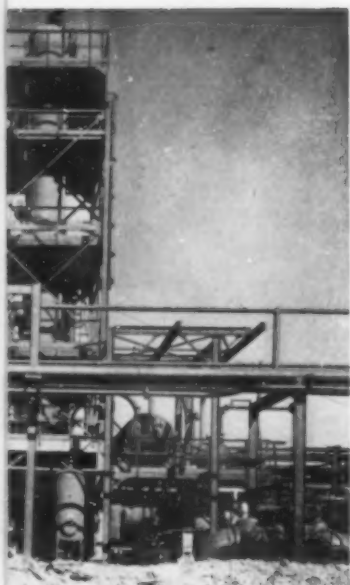


4 Products from the cracking operation are fractionated into gasoline stock and light and heavy fuel oils in the still

6 Volatile products are separated from less volatile in the light ends absorber

7 Light ends unit and front of two alkylators more refinery of Standard Oil Co. (N. J.)





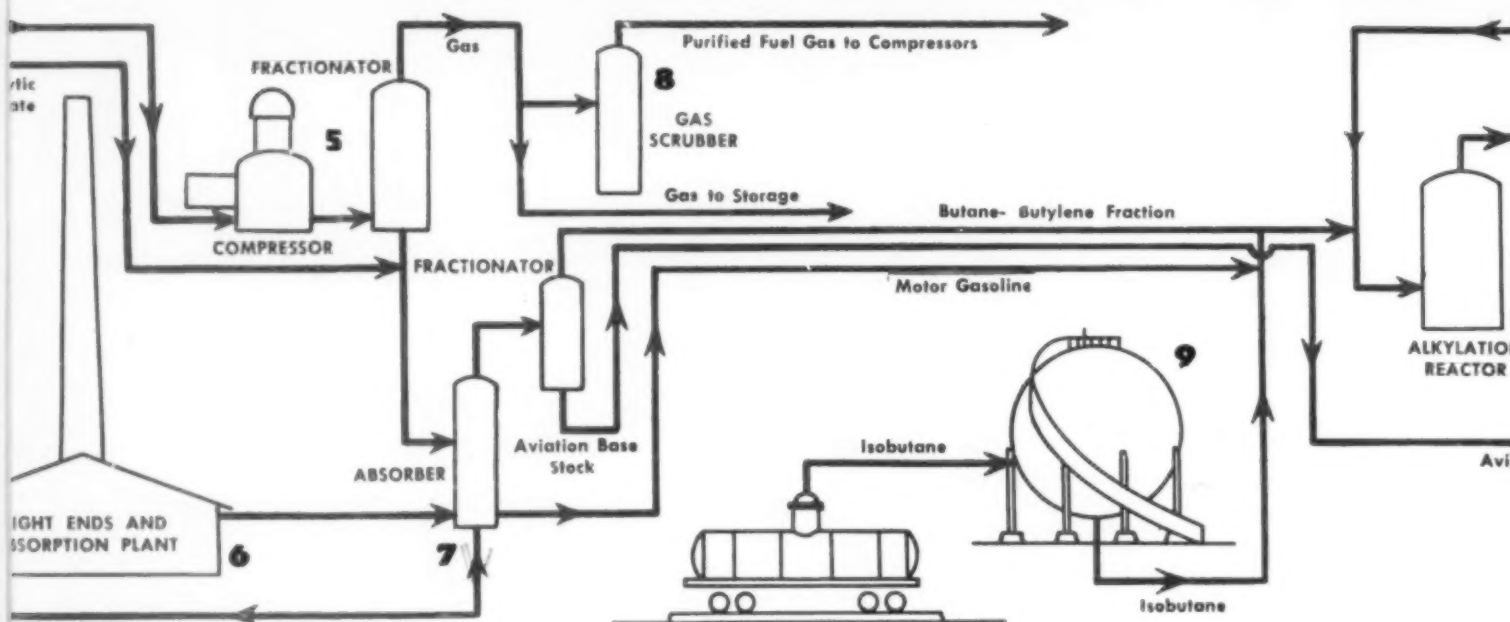
purified by treatment at the gas



9 Here is shown one of the several spherical tanks used for storage of gaseous materials at the refinery

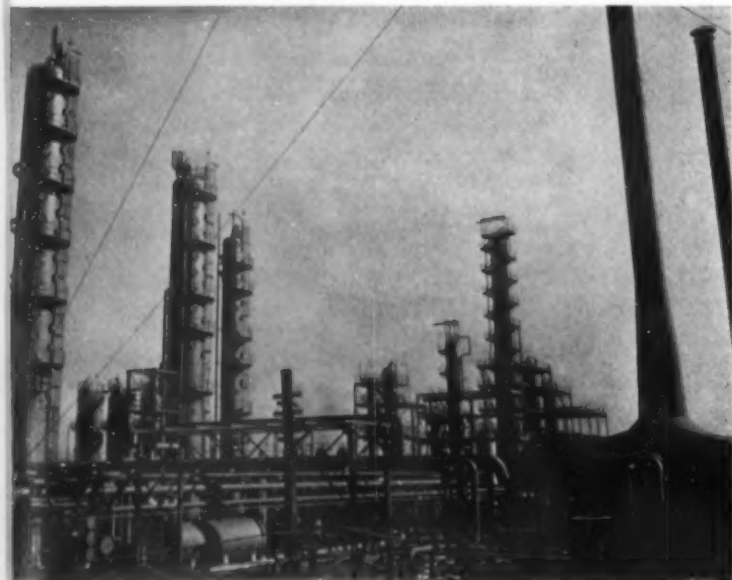


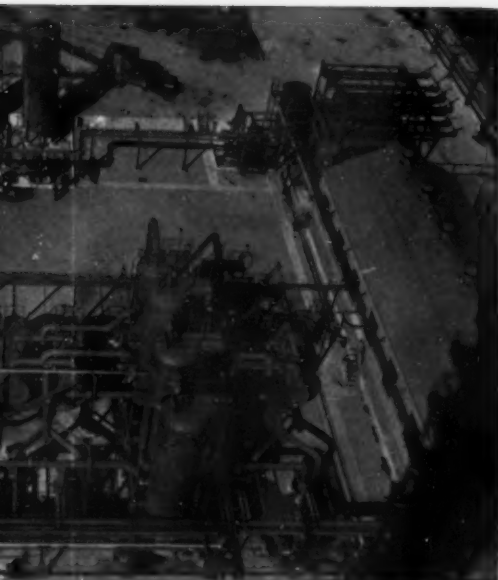
10 In alkylation plant olefins and isoparaffin catalyst such as sulphuric acid to give high



Light ends unit and front of two alkylation fractionators on right in the Baltimore refinery of Standard Oil Co. (N. J.)

12 At the loading racks the finished product is loaded into long lines of tank cars for consumer in many parts of the country

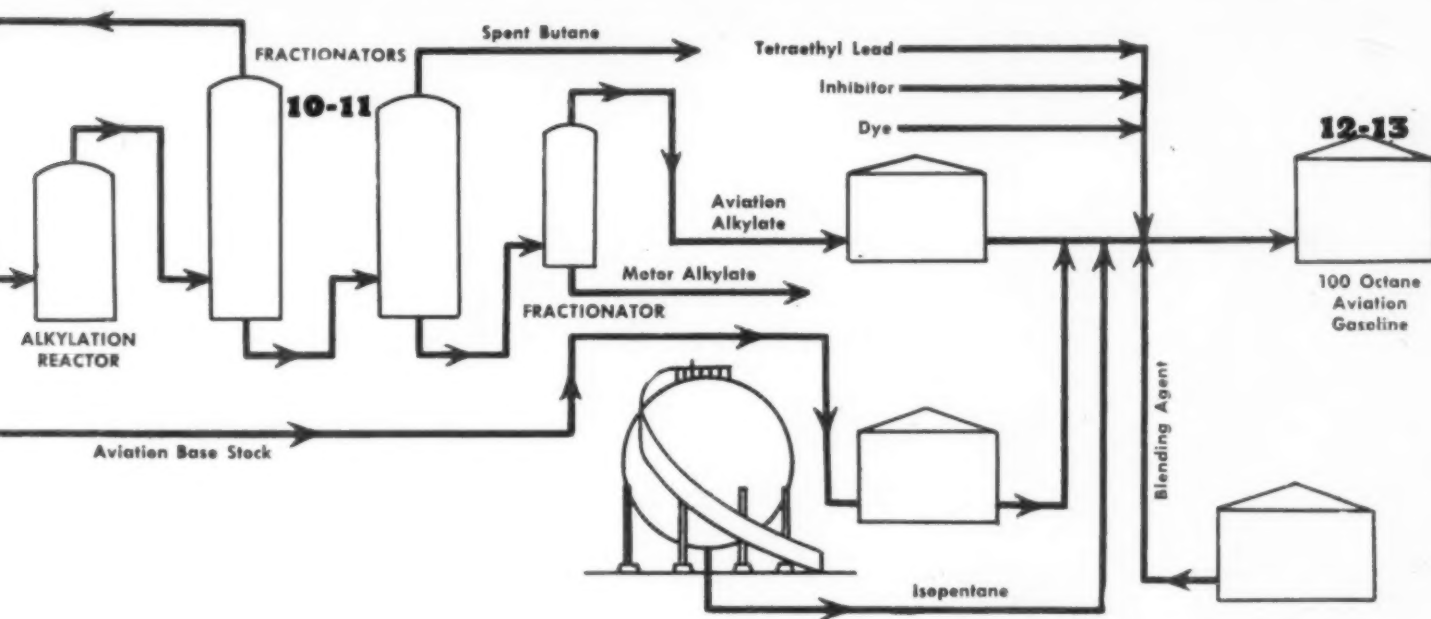




and isoparaffins are combined by treatment with a
to give high octane alkylate blending agent



11 Operations are controlled from control rooms containing panels on which are the
indicating and recording instruments shown



long lines of railroad tank cars for delivery to the

13 Products of the Baltimore refinery of the Standard Oil Co. (N. J.) to be distributed in
smaller volume are loaded into tank wagons



A Complete Line **CHEMICAL PROPORTIONING PUMPS**

*for the
Process Industries*

%Proportioneers% Heavy Duty Adjust-O-Feeders with specially designed measuring cylinders, stuffing glands and check valves for all gum inhibitors, sulphuric, nitric and hydrofluoric acids, caustic, solvents, sludge acid, regular and off-grade latex, styrene, butadiene, soap solutions, asphalts, etc.

● **MODEL 1XS Midget Series Simplex Adjust-O-Feeder**
Up to 7.5 g.p.h. 1,000 p.s.i.g.

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Up to 15 g.p.h. 1,000 p.s.i.g.

● **MODEL 2XS Standard Simplex Adjust-O-Feeder**
Up to 42 g.p.h. 500 p.s.i.g.

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Up to 84 g.p.h. 500 p.s.i.g.

● **MODEL 2XS High Pressure Simplex Adjust-O-Feeder**
Up to 50 g.p.h. 3,000 p.s.i.g.

● **MODEL 3XD High Pressure Duplex Adjust-O-Feeder**
Up to 100 g.p.h. 3,000 p.s.i.g.

FEATURES — MICROMETER stroke adjustment, FLUID-SEALED plunger and stuffing gland, needle bearings, visible capacity scales, long cross-head guides, interchangeable disc or built-in ball check valves. Each pump tested under job conditions. Certified calibration curves with each unit.

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29 CODDING ST., PROVIDENCE, R. I.

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NEW TRAINING AIDS FOR PIPING MEN



① "PIPING POINTERS" SOUND FILM

② "PIPING POINTERS" MANUAL

FACTS ABOUT THESE NEW CRANE SERVICES

The "Piping Pointers" film is 16 mm. size with sound track. Approximate showing time, 30 minutes. Available free for showing in any plant, trade school, or industrial training center. The "Piping Pointers" manual is supplied free for all viewers of the film.

ARE your piping maintenance trainees learning fast enough to replace skilled men gone to war? Can they assure your plant of dependable piping service while replacement materials are far from plentiful?

Training of workers is made faster and doubly effective by these new Crane "Piping Pointers" services. Each complements the other in teaching the fundamentals of piping and proper care of valves and fittings to keep up pipe-line efficiency.

The "Piping Pointers" Manual is the most complete service of its type ever compiled, its chapters ranging

from "The Language of Piping" to "Playing Safe on the Job." In the film, trainees see and hear how the manual's content is actually applied.

Available Free to Any Plant

Full information about these services and suggestions for using them most profitably are available on request from your local Crane Representative. Consult him regarding manuals for your piping crews, and showings of the "Piping Pointers" film in your plant.

Crane Co., General Offices: 836 S. Michigan Ave., Chicago 5, Ill.

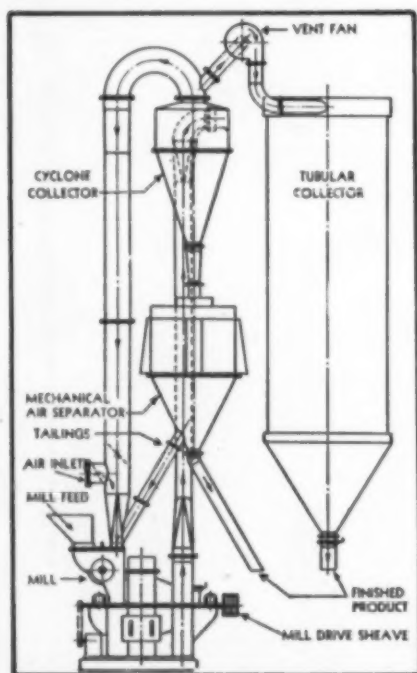
CRANE VALVES

How the IMP MILL ... SIMPLIFIES

PRODUCTION

For Closed Circuit Grinding

Flow sheet of the Imp Mill with Mechanical Air Separator and Tubular Collector for operations requiring extreme fineness and uniformity. The tailings go back to mill for regrinding.



**Readily Adaptable for
Various Pulverizing Jobs**
Standard Imp Mill at left as arranged for general grinding operations, such as in pulverizing and classifying bluestone, litharge and phosphate materials to uniform fineness. Also can be modified into a direct-firing unit to pulverize pitch for firing stills, and to grind small capacities of coal for industrial furnaces.

Whizzer-Equipped
Imp Mill at right shown with Whizzer Separator which gives wide range fineness control and greatly increased capacity on very finely ground materials, as in pigment grinding. Variable speed transmission on whizzer drive permits control of classification from 80% minus 100-mesh to 99.5% passing 325-mesh.

Write for Catalog No. 41

With Flash Drying

Operating as a Kiln Mill for removing moisture from materials while pulverizing, as in dehydrating copper sulphate and reducing it to a fine, dry powder.

RAYMOND PULVERIZER DIVISION

Combustion Engineering Company, Inc.

1311 North Branch Street

Chicago 22, Illinois

Sales Offices in Principal Cities



Canada: Combustion Engineering Corp., Ltd., Montreal

Chemical Engineering NEWS

WAR FOOD ADMINISTRATION ASKS MORE FERTILIZER

MORE fertilizer is still being demanded by War Food Administration in order to meet the crop goals set for 1944. The composite of these controls will require about 4 percent greater land acreage devoted to crops next year than during 1943. The major increases are asked for corn, hay, wheat (24 percent up), and the various oil seed crops. To supply these sources of protein and fat foods requires the support of the greatest fertilizer supply ever used by American agriculture. Actually, the use of fertilizer in such large tonnage is the only possible substitute for farm labor, which remains wholly inadequate for normal crop planting, cultivation, and harvesting.

Normal commercial channels of fertilizer supply will probably satisfy all, or nearly all, of the expected demands for fertilizer chemicals and mixed fertilizer. There is plenty of phosphate, about enough nitrogen, but a definite deficiency in potash supply. Only when one considers the distribution of fertilizer by the Government itself, through AAA soil conservation and TVA experimental programs, does there appear to be any significant shortage. But, as one cynic remarked, "There is always a shortage when things are given away".

The small anticipated deficiency in nitrogen supply is being largely offset by the new program for operation of ordnance plants to make ammonium nitrate as a fertilizer instead of for explosive use. The Ordnance Department of the Army has arranged to operate some of its works not needed for explosives with the technical assistance of TVA's chemical engineers. These technical men will either provide the coating materials needed, or actually direct the coating operations. The result should be a usable ammonium nitrate which will not give excessive difficulty in caking. TVA will continue its own plant operations and will be distributor for its own products and for the output of Ordnance plants at least through January 31. Imported supplies from Canada and the domestic products of Hercules Powder Co. are being sold through normal commercial channels.

At the beginning of December there was still uncertainty as to whether new capacity for manufacture of sulphuric acid would be authorized by WPB. A survey has been made of available acid supplies. If the total acid needed for superphosphate manufacture cannot be provided at the points of need, it was expected that one or two additional in-

stallations might still be made, even though production from new plants could hardly begin in time to aid in superphosphate supply for the 1944 crops.

SYNTHETIC LIQUID FUEL STUDY PLANNED FOR BUREAU OF MINES

THE Senate passed early in November, and the House of Representatives is likely to approve during December, a bill which authorizes the Bureau of Mines to project an extended series of pilot plant studies on the making of synthetic liquid fuels from coal, lignite, and oil shale. The bill authorizes an appropriation of \$30,000,000 which will be used for development work, pilot plant construction, and payment of operating deficits of pilot plants. Initially, the program contemplates investigations for a minimum of five years.

It is anticipated that it will be necessary to build several plants for demonstration purposes, made up of commercial-scale units. But it is very evident from the discussion in Congress that there is no intention to put the Bureau of Mines into business on any commercial scale. The declared purpose of Congress is that these plants will collect the necessary economic and engineering information by which industrial firms may later proceed to build really commercial works.

Oil shale processing will presumably be investigated in the Western states of Colorado, Wyoming, and Utah. Some processing of lignite for the manufacture of gas from which to make liquid fuels is proposed. The largest unit ultimately contemplated will presumably process bituminous coal, probably in West Virginia or Pennsylvania. But none of these projects will start on any large scale during 1944 because the Bureau expects to ask for not more than \$1,000,000 for its chemical engineering investigations during the coming fiscal year, 1944-45. The work will be directed by Dr. Arno C. Fieldner, Chief of the Fuels Division of the Bureau.

ACCIDENT RATES IN CHEMICAL INDUSTRY BELOW AVERAGE

THE National Safety Council has issued a report on accident rates in the chemical industry for 1942. It is the largest coverage ever reported to the Council and summarizes the records of 475 chemical plants. The frequency rate for chemicals was 9.90 as compared with 14.85 for all industry and the severity rates were 1.49 for all industry and 1.29 for chemical industry. The chemical industry's frequency rate of 9.90 ranked seventh in a list of 31 major industries and was 33 percent below the general average. However the showing in severity was less favorable. The severity rate of 1.29 ranked fourteenth and was 13 percent below the general average rate of 1.49.

The report states that the most important unsafe practice in serious accidents was cleaning, repairing or otherwise working on moving equipment, pipe lines under pressure, or energized electrical equipment.

STATISTICAL DATA COMPILED BY WPB WILL BE RELEASED

MUCH of the statistical material on industry heretofore treated as restricted war information will soon be made available to American business for planning present and future operations, it was announced last month by Donald M. Nelson, chairman of the War Production Board.

Releases insofar as dependable facts are available, will cover the period from the beginning of the wartime restrictions on information to the present. Frequent reports will then be made until most of the major lines of industry have been reported. After business and the country have thus been brought up to date, subsequent releases will be issued monthly or quarterly for each line of industry or each product.

The first releases on chemicals have been released and will be found on page 205 of this issue.

DO YOU WANT A CHEM. & MET. INDEX FOR 1943?

WPB's latest cut in the paper tonnage available for use has forced us to abandon our usual practice of binding the annual index into the December issue of *Chem. & Met.* Announcement of this fact was made last month. (See *Chem. & Met.*, Nov. 1943, p. 159.) We have, however, printed the index as a separate 8-page pamphlet. These will be mailed without charge to readers who request them just as long as the supply lasts. Requests should be sent to Index Editor, *Chem. & Met.*, 330 W. 42nd St., New York 18, N. Y.

WORK BEGUN ON NEW CHEMICAL PLANT OF CELANESE CORP.

THE contract for the construction of the Celanese Corp. of America's new \$5,000,000 chemical plant near Corpus Christi at Bishop, Nueces county, Texas, has been awarded to the Gasoline Plant Construction Co., of Houston, Texas. Recognized as one of the oldest and most reputable companies of its type in the southwest, the construction organization has already broken ground for the new plant on the site of about 300 acres purchased by the Celanese Corp. some time ago.

The chemical research and engineering phase of the Celanese company's expanded program, conducted at Cumberland, Md., for nearly a decade under the direction of Joseph E. Blutworth, a native of Texas, in charge of research and development at the local plant, will gain new impetus as a result of the production of chemicals such as acetaldehyde, from aldehyde and methanol from petroleum in Texas.

Started in 1934 with only a few chemists in the department, the chemical research division now numbers more than 100 specialists. Some of these are already in Texas to assist in preparations for construction of the new project, and it is expected that many others of the personnel will be transferred to the new plant from time to time as construction progresses.

That the Celanese Corp. has been granted approval for plant construction in the face of wartime restrictions indicates that high government officials evidently passed the Texas project because they were convinced of the company's ability to produce needed chemicals of high quality without drawing heavily on critical materials.

GAS ASSOCIATION BROADENS NATURAL GAS DIVISION

NATURAL gas will have an increasing recognition in American Gas Association to reflect the increasing importance of natural gas as a source of public utility fuel supply. This decision was reached by A.G.A. at its October meeting in St. Louis.

Proposed changes will not significantly affect either technical or general management policies except to strengthen the recognition of natural gas companies and the executives and engineers connected with such firms. It is anticipated, for example, that there will be two vice-presidents of the Association—one from natural gas, and one from manufactured gas divisions. And it is expected that in alternate years the president will be selected from the natural gas membership.

PLASTICS GROUP FORM TO CONTINUE STUDIES

THE Plastic Institute Alumni Association was recently formed in New York to continue the study of new plastics in close contact and cooperation with the industry. All graduating groups

of the Plastic Industries Technical Institute are joining the association which has coordinated several committees acting on an extensive program with the cooperation of leading representatives of the industry. Officers of the newly formed association are Dr. M. G. Luft, president; Fred De Feo, secretary; and H. Rogers, treasurer.

ARGENTINE COMPANY TO MAKE TANNING EXTRACTS HERE

THE Argentine Consulate announced on Dec. 1, that the Sociedad Anonima Exportadora de Productos Tanicos (Tannin Products Export Corporation) had begun business in the United States, dealing chiefly in quebracho extract.

The announcement said the company had bought a factory in Newark to process the bark from which the extract is obtained. Organization of the company, capitalized at the equivalent of \$1,250,000, was an aftermath of anti-trust proceeding earlier this year against a British concern, Forestal Company, which through subsidiaries controlled a large part of Argentine production and sold in the American market.

B. F. GOODRICH WILL BUILD SYNTHETIC TIRE PLANT

AT THE beginning of the month the B. F. Goodrich Co. announced plans for construction of a new synthetic tire manufacturing plant at Miami, Okla. Company officials said the site was chosen after an extensive survey of the Southwest, and after conferences with Oklahoma's Gov. Robert E. Kerr and other State officials.

PILOT PLANT WILL MAKE ALUMINUM FROM CLAY

HARLEYVILLE, S. C. has been selected by Defense Plant Corp., at the site for the country's first aluminum-from-clay pilot plant. Use of the materials required has been approved by the War Production Board, and construction is already in progress. The contractor is Daniel Construction Company, Inc., of Greenville, S. C., and Birmingham, Ala.

DRACKETT CO. DEVELOPS NEW SOYBEAN FIBER

THE first commercial production of a fiber made from soybeans was started on Dec. 2 at Cincinnati. H. R. Drackett, president of the Drackett Co., announced that his company after extensive research and development work was now producing the fiber in commercial quantities which would be enlarged as materials and productive capacities could be increased.

ARMY AND NAVY "E" AWARDS

Among the companies which, in the past month have been awarded the honorary Navy "E" and joint Army and Navy "E" burgee for exceeding all production expectations in view of the facilities at their command, are included the chemical and explosives plants, the chemical process industries and the chemical engineering equipment concerns listed below.

Anderson Tool and Mfg. Co., Chicago.

Appalachian Mills Co., Knoxville, Tenn.
Associated Spring Corp., Bristol, Conn.
Avey Drilling Machine Co., Covington, Ky.
Barlow & Seelig Mfg. Co., Algonquin, Ill.
Barnes Mfg. Co., Mansfield, Ohio.
Bath Mills, Inc., Bath, S. C.
Beaton & Corbin Mfg. Co., Southington, Conn.
Bell Sound Systems, Inc., Columbus, Ohio.
Beloit Iron Works, Beloit, Wis.
Charles H. Besly Co., Beloit, Wis.
Binks Mfg. Co., Chicago.
Blackhawk Mfg. Co., West Allis, Wis.
Buck X-Ograph Co., St. Louis.
Buffalo Bolt Co., North Tonawanda, N. Y.
Candler-Hill Corp., Detroit.
Chiksan Tool Co., Brea, Calif.
Cook Electric Co., Chicago.
Crossett Lumber Co., Crossett, Ark.
Davey Compressor Co., Kent, Ohio.
DeVlieg Machine Co., Ferndale, Mich.
Erie Resistor Corp., Erie, Pa.
Farrell Mfg. Co., Joliet, Ill.
Gellman Mfg. Co., Rock Island, Ill.
General Mills, Inc., mechanical division, Minneapolis.
B. F. Goodrich Co., Oaks, Pa.
Gray Stamping and Mfg. Co., Plano, Ill.
Hastings Mfg. Co., Hastings, Mich.
Hercules Powder Co., Bacchus, Utah.
Hewitt Rubber Corp., Buffalo.
Hewlett-Packard Co., Palo Alto, Calif.
Frank G. Hough Co., Libertyville, Ill.
Hudson Sharp Machine Co., Green Bay, Wis.
Illinois Glove Co., Champaign, Ill.
International Minerals and Chemical Corp., magnesium division, Austin, Texas.
Johnson City Foundry and Machine Co., Johnson City, Tenn.
Ken Tool Mfg. Co., Akron, Ohio.
Koehring Co., Milwaukee.
Landers, Frary & Clark, New Britain, Conn.
Milwaukee Flush Valve Co., Milwaukee.
Mines Equipment Co., St. Louis.
Mississippi Foundry Corp., Rock Island, Ill.
Missouri Valley Bridge and Iron Co., Evansville, Ind.
Moore Equipment Co., Stockton, Calif.
National Electric Machine Shops, Inc., Washington, D. C.
National Enameling & Stamping Co., Jacksonville, Ill.
National Foam System, Inc., Philadelphia.
Ordnance Gauge Co., Philadelphia.
Pacific Coast Borax Co., Boron and Wilmington, Calif.
Peerless of America, Inc., Marion, Ind.
Perfection Gear Co., Harvey, Ill.
Portland Co., Portland, Me.
Posey Mfg. Co., Hoquiam, Wash.
Pyro Clay Products Co., Oak Hill, Ohio.
Radio Condenser Co., Camden, N. J.
Read Machinery Co., York, Pa.
Reed & Barton, Taunton, Mass.
Robinson-Houchin Optical Co., Columbus.
Walter Scott & Co., Inc., Plainfield, N. J.
Sheet Metal Products, Inc., Newark, Clifton, and Bloomfield plants, N. J.
Alexander Smith & Sons Carpet Co., Yonkers, N. Y.
Soule Steel Co., San Francisco.
Southern Steel Works Co., Birmingham.
Spring Cotton Mills, Lancaster, S. C.
Square D, Kollsman instrument division, Elmhurst, N. Y.
Stahl-Meyer, Inc., Brooklyn.
James Stewart & Co., Inc., Bethpage, N. Y.
Tarrant Mfg. Co., Saratoga Springs, N. Y.
Tennessee Eastman Corp., Kingsport, Tenn.
Turner Brass Works, Sycamore, Ill.
Universal Blank Co., Inc., Southbridge, Mass.
Viking Refrigerators, Inc., Kansas City, Mo.
Western Pipe and Steel Co. of Calif. San Pedro, Calif.
Wiley Machine Co., Los Angeles.
Willson Products, Inc., Reading, Pa.
Wilson Co., Inc., Atchison, Kans.
York Corp., York, Pa.

WASHINGTON NEWS

DEFINITE INDICATIONS that the war has entered another phase where it has been won but is not yet over has caused official Washington to give more serious consideration to means of ending war contracts. Methods by which contracts should be terminated are being studied in procurement, in the armed services, in the War Production Board, on Capitol Hill, by close advisors of the President, and by some of the old line government agencies. There seems to be unanimity of thinking concerning what should be done. Termination of contracts should be handled with speed and finality and be subject to review only for fraud.

A resolution unanimously adopted by the Federal Advisory Council and made public by the Federal Reserve Board expresses the ideas of that body on the subject. It explains what action they believe is necessary to avoid unemployment and hardship of great numbers of the population in the period of reconversion from war production.

The Federal Advisory Council believes: (1) That war contracts which are terminated must be settled and settled promptly and finally by negotiated agreements between the contractor and the procuring agency of the government which negotiated the original contract.

(2) That settlements so negotiated should be final and not subject to review by any other agency except for fraud. Any amounts that might conceivably be saved the government through a post-audit will fade into insignificance in comparison with grants for relief that will be necessitated by resulting delay, uncertainty, and unemployment.

(3) That if settlements of terminated contracts when negotiated by the procuring agencies are not final, or if they are made subject to subsequent audit, credit for working capital needed for reconversion after the war may, in many cases, be unavailable until the settlement does become final and the basis of credit thereby becomes ascertainable. This applies particularly to those contractors whose capital is relatively small.

(4) That Congress should relieve contracting officers who negotiate settlements from personal responsibility, except for fraud.

(5) That Congress should enact legislation providing more adequate means of interim financing of contractors whose contracts have been canceled when for unavoidable reasons there is delay in final settlement and payment.

(6) That appropriate plans should be made in advance for the prompt removal of surplus government materiel and facilities for plants whose contracts are terminated."

Washington believes that it is quite likely that the War Production Board will direct demobilization of industry when the war is over. In spite of the emphatic denial of Bernard Baruch that he personally sponsored the idea, many in Washington believe that the present machinery will be used. If this should come to pass, the tools that would have to be used by WPB in handling the gigantic task ahead would be the industry advisory committee.

Already there is a general exodus of industrial men from government posts in Washington. Industry is making a mistake in permitting its executives to leave Washington prematurely. Most of these men know their way around the city and in the coming months when the problems of contract termination and reconversion must be handled they can be of great value both to their government and to industry as a whole. Industry will have no one but itself to blame if the new crop of government men fails to give satisfaction.

SURPLUS MATERIALS

Tied closely to contract termination and reconversion is the problem of disposing of surplus materials. The thinking in government circles is that one established government agency should have the sole duty of disposing of surplus materials.

In considering the problem of termination of contracts, the Army insists that emphasis is to be on fairness rather than on the best deal that can be forced by the contracting officers. It is their intention to end contracts on a fair and reasonable basis for both parties.

In line with the idea that contracts must be terminated with speed and finality, a concrete suggestion comes from the War Department that companies with war contracts should get ready now for any eventuality. Because the industrial concerns can make or lose tremendously on the way the termination is handled, it is felt that an executive committee should be set up now in each concern to gather the necessary information. Decision should be made now concerning what part of the work in process the company would like to keep and what they're willing to offer for it. An inventory of the tools and dies that the company would like to keep and those to be disposed of should be made and the amount to be offered for those to be kept determined at once. The Army procurement officers also suggest that raw materials and equipment should be kept out of government hands as much as possible. This is not official policy—merely unofficial thinking out loud.

If carried out, it will do much to relieve industry of the danger that excessive government-owned surpluses will be dumped on the market in the postwar period. The speed with which industry converts to peace-time production after the war also will have a direct bearing on chemical production.

Policy of the Army in cutting back production will be of interest to chemical producers. If there are a number of manufacturers making the same item, for instance machine guns, and the present requirements can be satisfied by the production of only a few of the manufacturers, the cutback will not be horizontally across all contractors. The contracts of the inefficient producers, based on man hours, will be terminated. The Army has the comparative cost and man-hour figures which have been gathered in considering contract renegotiation.

It is felt that this policy would be most helpful to business. During the war, prices have been good. The general tendency has been to allow inefficiency to creep into industrial production. By penalizing inefficient producers, industry will be reconditioned for the highly competitive market conditions that will be met in the postwar period. Some facilities are going to be released from war contracts within the next few months, which will give an opportunity to see if this policy works out. Also, it will be interesting to see if the inefficient operators can be prevented from getting a head start on production of civilian items. It will be done by controlling the distribution of raw materials.

SYNTHETIC LIQUID FUELS

First step along the long legislative road was successfully taken by the Bureau of Mines synthetic liquid fuels program when the Senate passed S. 1243. In its original form, this bill was to authorize "the construction and operation of demonstration plants to produce synthetic liquid fuels from coal and other substances, in order to aid in the prosecution of the war, to conserve and increase the oil resources of the Nation and for other purposes."

S. 1243 is an authorization bill. A number of amendments were added by the Senate including a time limit of 5 years and a limit on the total expenditure of \$30,000,000. Another Senate amendment put the emphasis on pilot plant operations rather than larger and more costly demonstration plants as specified in the measure as it was originally written.

Senate amendments definitely hedge the activities contemplated with barriers to keep the government out of business. The amendments also will hold the size of the operations within bounds. The effect should be to make

the passage of the appropriation bill easier. Unofficially, the Bureau of Mines is happy about the changes and probably will offer no serious objections.

Next move in the legislative chain will be the passage of Congressman Randolph's companion bill, H. R. 3209, in the House. If the authorization measure is enacted and signed by the President, a request for an appropriation will be made through the regular channels.

In the meantime the Bureau of Mines has a preliminary program laid out for the Pittsburgh, Pa., experiment station to be undertaken with funds from the Bureau's regular appropriation. Part of the work will be done at Forbes Street and part at Brewston. The Bureau wants to enlarge the work on the direct hydrogenation of natural gas and synthetic process as applied to coal.

In the testimony before the Senate Committee on Public Lands and Surveys which considered S. 1243, Robert P. Russell, executive vice-president, of Standard Oil Development Co., brought out some interesting relative cost figures. These indicated that the cheapest method would be to reform natural gas. Other testimony indicated that lignite would probably be the next most inexpensive raw material.

Testimony of H. H. Storch, principal Physical Chemist, Bureau of Mines, indicates the official attitude of the Bureau toward these two sources of raw materials. Said Mr. Storch: "Industrial development of the Fischer-Tropsch process in the United States, using cheap natural gas such as is available in the Kansas and Texas fields, is imminent. The cost of production per gallon of gasoline and Diesel oil, with natural gas at 5 cents per 1,000 cubic feet, was given by the Standard Oil Co. of New Jersey in 1942 as about 9 cents. In some areas natural gas may be obtained for less than 3 cents per 1,000 cubic feet, so that the cost per gallon of gasoline and Diesel oil should be about 8 cents. Natural gas at 3 cents per 1,000 cubic feet is equivalent to coal at about 60 cents per ton. Some of the huge deposits of subbituminous coal in our western states can be mined and delivered even at this low cost. Possible improvements in the catalysts and in the engineering features of the process may reduce the production cost by a few cents per gallon. Hence, in view of the probable increase in cost of gasoline from petroleum (which is now held at 5 to 6 cents per gallon), the Fischer-Tropsch process probably will be developed on a large scale in the near future in cheap natural-gas or coal areas."

ALCOHOL FROM WOOD

Cost figures for the production of alcohol from wood sugar were presented to the Gillette Senate Subcommittee early in November. The information was contained in the testimony of C. A. Rishell, Director of Research,

Timber Engineering Company, an affiliate of the National Lumber Manufacturers Association. The lumber industry is interested in the possibility of establishing a wood sugar industry to profitably utilize mill wastes. The activity of the Timber Engineering Company has been centered about the Scholler process.

Briefly the Scholler process is to pass intermittently a small amount of dilute sulphuric acid through charge of saw dust or chips that has been placed in an upright steel cylinder or percolator. A moderate steam pressure is maintained during the application. As the acid passes through the wood it produces sugar. The residue is lignin, an almost entirely free from wood cellulose. After the acid and sugar have been collected in tanks, the mixture is neutralized by the application of lime or limestone. Alcohol for industrial use or yeast for high protein cattle feed is produced from the neutral sugar solution by fermentation.

The Committee was told by Mr. Rishell: "The total cost of a wood sugar and distillation plant for the production of five million gallons of alcohol per year is believed to be approximately a million and a half dollars. Such a plant would consume about 360 tons of sawdust per day. It is difficult to determine the exact cost of producing a gallon of alcohol by this process. Accurate figures can probably never be developed until a full scale plant is in operation in this country. Much will depend upon the price paid for wood waste. In some sections of the country this could be obtained for as little as 50¢ per ton. In other sections it might run as high as \$2.00 to \$2.50 per ton. Alcohol in substantial quantities could probably be manufactured, paying for chemicals, labor, repairs, maintenance, amortization, interest, etc., for 25¢ per gallon. If the lignin is sold for only 1¢ a lb. or \$20.00 a ton, the cost of alcohol production would be reduced it is estimated by 9¢ per gallon."

FOREIGN TRADE CONTROL

A three-sided scramble for control in foreign trade affairs seems to be under way with the Department of State, Jesse Jones and Leo Crowley the respective champions. At the beginning of December the new organization of the Foreign Economic Administration was taking shape but at that time it appeared that the Reconstruction Finance Corp. had not transferred any of the personnel or functions of its subsidiary organizations as directed by Presidential order. At the same time, efforts were being made by members of the State Department to subject trade negotiations in foreign countries to State Department domination giving FEA the questionable privilege of concurring with State Department ideas.

Washington gossip is to the effect that Jesse Jones has defied the three Executive Orders setting up FEA and transferring various functions to it. It

also is claimed that FEA officials have excused the situation on the ground that FEA did not have the necessary money. This sounds like so much rubbish. The Executive orders transferred not only the functions but the funds and personnel as well. The fact of the matter is that Mr. Crowley has not had his organization set up until recently and only in December was it ready to take over.

In mid-November administrative orders were issued by Mr. Crowley's office outlining the frame work of the organization of FEA and the functions of its various parts. Of interest to the Chemical Industry is the Bureau of Supplies and the Bureau of Areas where the operating functions are concentrated. In general the Bureau of Areas "will coordinate the development of area programs, work with the State Department in obtaining policy determinations, relate programs to military plans, and assist in the direction of field operations." The Bureau of Supplies will actually handle the procurement of supplies in foreign countries and the control of exports both commercial and otherwise.

The struggle for power between FEA and the State Department may be very real. Washington observers who know Leo Crowley agree that he will carry the fight to the White House. Since the President was concerned with matters of high strategy during early December no clarification may be looked for until after Christmas.

FORWARD PLANNING

Facts released during December must be taken into consideration by the chemical industry in making plans for 1944: 1. Production of military goods has passed its peak; 2. Contract cancellations are now becoming actual cutbacks in going enterprise. Heretofore, cancellations have been of projects scarcely underway or even in the blueprint stage; 3. The cutbacks are selected, affecting largely Army heavy equipment and raw material contracts. Programs for Naval construction, airplanes, heavy transports, heavy type tractors and quartermaster supplies will be continued as "must" programs.

These revisions in the supply program will result in labor release that will produce, at least locally, substantial unemployment before spring. Naturally, plans of the Government were not definite when these lines were written in early December. Washington suggests that chemical producers who wish to protect themselves from future eventualities may be able to find the answer to the problem by tracing their products to end uses.

Obviously, Washington intends to replace cancelled military programs with authorizations for the manufacture of civilian goods. The limiting factor at the moment appears to be shortages in a few of the basic raw materials such as steel. It may be assumed that raw materials will be relieved of tight controls at the first opportunity as in the case of wool.

INTERPRETING WASHINGTON

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This installment covers orders, rules and regulations issued by the War Production Board and the Office of Price Administration during November, 1943. Copies of each item interpreted may be obtained by writing to the appropriate federal agency.

CHARCOAL

MPR-431, Amendment 4, was issued by OPA on Nov. 11 establishing the same maximum price—\$40 per ton—for kiln charcoal sold in bags by producers as had previously been established for kiln charcoal in bulk. This was done in order to assure consumers of a supply of kiln charcoal in bags, and amounted to raising the ceiling price from \$6 to \$11 per ton so that producers could meet industrial needs without incurring loss.

40 PERCENT OLEUM

Revised Supplementary Regulation No. 1, Amendment 36, was issued by OPA on Nov. 11, continuing the exemption from price control of sales of 40 percent oleum (109 percent sulphuric acid) to ordnance plants. This exemption will continue indefinitely since it does not appear that unwarranted price increases are apt to develop.

DYESTUFFS AND ORGANIC PIGMENTS

Conservation Order M-103 was amended by WPB on Nov. 18 to correct minor errors which appeared in the Oct. 23 amendment. The controlling definition for uniform materials is restated to conform with Order L-224 and Order L-85. In addition, the provision regarding use of Class A dyes for civilian purposes is corrected to make it clear that 25 pounds can be sold for civilian use in any calendar quarter.

INDUSTRIAL AND GENERAL PURPOSE THERMOMETERS

Limitation Order L-272, Schedule VII, was issued by WPB on Nov. 10 eliminating a number of sizes, types and special features of industrial and special purpose thermometers. The new Schedule restricts scale ranges in industrial thermometers between minus 40 degrees and plus 950 deg. F. to a definite list. It provides that cases and case fronts shall not be made of copper or copper alloy other than copper tubing, copper alloy tubing or cylindrical extruded shapes.

INDICATING DIAL PRESSURE GAGES

Limitation Order L-272, Schedule IV, was amended by WPB on Nov. 11 to make a few minor changes. The definition of indicating dial pressure gages was changed to make it clear that the Order applies to pressure instruments in either round or square cases. Additional ranges in the 3½ in. and 2½ in. gage sizes are permitted. The amended Order also permits the production of simplified combination pressure and vacuum gages for fire fighting equipment. As a safety precaution, the restriction on brass cases was modified to permit them for the 4½ and 6 in. gages manufactured with a solid front for use with compressed gases such as hydrogen, oxygen, nitrogen, helium, acetylene and carbon dioxide.

REFRIGERANTS

Conservation Order M-28 was amended on Nov. 12 by WPB to release restrictions on four refrigerant compounds formerly covered by the Order, and at the same time tighten restrictions on delivery of dichlorodifluoromethane, known commercially as Freon-12. In addition to the present prohibition on delivery of Freon-12 for air conditioning systems used for comfort cooling and a few types of refrigerating systems, a new restriction is imposed which prohibits delivery until April 1, 1944, for any other system except where it operates under one or more of the operating conditions specified in the Order as amended.

Under the Order, suppliers of Freon-12 at the retail level are permitted in general to make deliveries for civilian uses only. Military agencies will handle their own distribution. The producer's deliveries will continue to be controlled by allocation directives, with monthly allocations dividing the available supplies between military and civilian requirements.

ANTI-FREEZE MIXTURES

WPB has issued a statement explaining the control over the production and distribution of anti-freeze compounds. Order L-258 prohibits the manufacture

and sale of certain anti-freeze solutions which, because of chemical or physical changes which occur in the radiators of automobiles, severely damage the radiators. Order L-51 requires manufacturers who desire to manufacture anti-freeze from certain specified materials to secure a quota from the War Production Board for such manufacture. The materials which are thus included in Order L-51 are ethyl alcohol, ethylene glycol, methyl alcohol and isopropyl alcohol. Order L-51 is purely and simply a manufacturing Order and contains no provisions regarding the manner in which anti-freeze is to be distributed. WPB, however, under powers contained in Priorities Regulation No. 1 has issued directions to those manufacturers who produce anti-freeze from the above mentioned materials and who distribute their products throughout the entire country.

The largest amount of anti-freeze which will be made this year will be made from ethyl alcohol. This will amount to approximately 46,000,000 gallons. A total of 8,000,000 gallons will be made from ethylene glycol, and the balance will be made from isopropyl alcohol, wood distilled methyl alcohol, and certain grades of synthetic methyl alcohol.

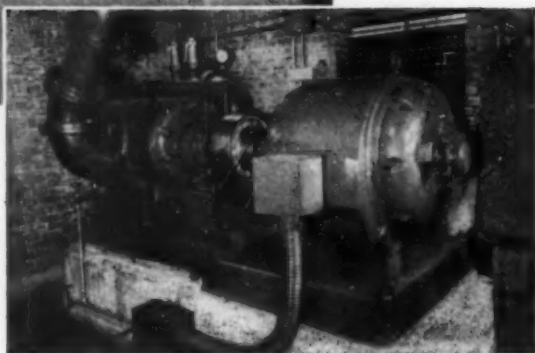
LINSEED OIL

MPR-53, Amendment 9, was issued by OPA on Nov. 16 providing that sellers of linseed oil who have customarily allowed discounts for prompt payment must continue this practice. This ruling was made after numerous complaints from buyers of linseed oil who claimed that the discontinuing of the discounts had the effect of an increase in the cost of the oil. Apparently many medium and small paint companies found it difficult to absorb the additional cost.

SODIUM METASILICATE

Allocation Order M-355 issued by WPB on Nov. 1 places sodium metasilicate under allocation. The Order requires that on and after Dec. 1 no primary supplier shall deliver sodium metasilicate except as authorized by WPB whether the product is in anhydrous or hydrated form. Deliveries to customers ordering more than 8,000 pounds during any month must be individually authorized. Deliveries to customers ordering between 800 and 8000 pounds per month will be authorized on the basis of end-uses stated in the customer's application. Orders of 800 pounds or less do not require any authorization or reference to end-use. Each customer receiving more than 8000 pounds must file with the War Production Board a report showing the use of sodium metasilicate by quarters for the two-year period ended September

ROTARY FULLER COMPRESSORS



BUILT FOR TROUBLE-FREE OPERATION

Rush! Rush! Rush! More speed all along the line. That's the cry today. But speed is not enough . . . equipment must be able to stand up under the most severe operating conditions . . . service must not be interrupted. Breakdowns—delays—time out—all mean loss of vital production and money out of pocket.

With this thought uppermost, only the best of materials and workmanship go into the makeup of Fuller Rotaries. They're built for trouble-free operation and performance records prove them to be just that. When, after long, gruelling operating periods, inspection and check-up is desired, the machine design permits doing this quickly and easily.

FULLER Rotary Compressors are built for capacities to 1800 C.F.M. actual free-air delivery, 125-lb. pressure. Vacuum pumps for vacuums to 29.90-in. (referred to 30-in. barometer).

Write for Bulletin C-5, fully illustrating and describing Fuller Rotaries.

FULLER COMPANY

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Marquette Bldg.

WASHINGTON, 5, D.C.
Colorado Bldg.

SAN FRANCISCO, 4
Chancery Bldg.

C-80

30, 1943, but is not required to file such report periodically. This report must be filed on or before the 15th of the month preceding the first month in which he expects to receive more than 8000 pounds of the product. In all of these restrictions, the number of pounds is calculated on an anhydrous basis.

WEST COAST ETHYL ALCOHOL

MPR-295, Amendment 4, was issued by OPA on Nov. 9 providing the same uniform method for pricing industrial alcohol on the West Coast that has been applied to producers in other areas. Current costs may now be used as the basis for computing maximum prices of industrial ethyl alcohol, whereas previously they were based on the cost of production for the preceding quarterly period. In addition to providing a uniform countrywide pricing method, this change was necessary because a number of the wineries which have converted to industrial alcohol production are not in continuous production, so that the previous method is not always practicable.

BORIC ACID

Conservation Order M-161 was amended by WPB on Nov. 1 to make borax and boric acid subject to the minimum practicable inventory restriction of Priorities Regulation No. 1. It is intended to make more boric acid available for consumption by these restrictions.

NEW CONSTRUCTION

Limitation Order L-41 was completely revised and reissued by WPB on Nov. 1. In addition to simplifying regulations and instructions, the revised Order makes several important changes. Among these, minor capital additions under CMP Regulation No. 5 in certain of the more essential industrial plants are excepted from the L-41 restriction. In calculating costs to determine if a job is within specified L-41 limits, the cost of used material, or the value of labor furnished free, need no longer be included. Cost limits now refer to the calendar year, instead of to any consecutive twelve month period. A limit of \$200 is placed on any type of construction for which a higher specific limit is not authorized by the Order. This overall limit formerly was \$1,000.

CALCIUM CARBIDE

Supplementary Regulation 14, Amendment 49, was issued by OPA on Nov. 1 providing ceiling prices for Defense Supplies Corporation sales of calcium carbide, a raw material used in the manufacture of acetylene, acetic acid, acetate rayon, neoprene and other chemicals. The new prices, established for various grades of carbide and classes of purchasers, range from a price for generator grade of \$50 a ton f.o.b. producing point for chemical plants purchasing allocated car-lot quantities in 5 ton bulk containers at a rate of more than 50 tons a month, to \$95 a ton delivered to industrial customers in cities where the DSC warehouses the chemical.

PINE TAR AND OIL

MPR-446, Amendment No. 1, was issued by OPA on November 24 to increase the maximum price for sale of pine tar or pine tar oil by about 2½ cents per gallon, and for sales of pine wood charcoal by \$5 per ton. This increase in maximum price was authorized to offset increased production costs due to wage increases, and at the same time to stimulate production of products which are critically needed in the war program.

GLASS PAINT CONTAINER

Limitation Order L-103 was amended on November 20 by WPB making additions to the list of standard containers. A one gallon container was added to the permanent standard list, and provides the head space necessary for one of the two main types of paint. Three other containers, (exhibits 1, 2 and 7 in Schedule E as amended April 5, 1943 but omitted in the amendment of September 20, 1943) have been added to the list of temporary standards.

MIXED FERTILIZER, SUPER-PHOSPHATE AND POTASH

MPR-185 was amended by OPA on November 17 to set dollars-and-cents maximum prices for every grade of fertilizer, superphosphate and potash whose manufacture and sale is permitted by the War Food Administration. No important changes in prices have been made in fixing these new price schedules. Ceilings are maintained at approximately the average level prevailing during the base pricing period in Feb., 1942.

MECHANICAL RUBBER GOODS

MPR-149, Amendment No. 15, was issued by OPA on November 3 establishing specific maximum prices for several kinds of rubber hose and belts. These replace individual maximum prices which had to be determined separately by each manufacturer. However, there will be little change in the level of prices and there will be no effect felt by consumers. Products included in this amendment are conveyor belting, transmission belting, air hose, and high pressure hydraulic control hose.

DOUGLAS FIR LUMBER

RMPR-26, Amendment No. 4, was issued by OPA on November 30 to increase the maximum prices for Douglas fir dimension lumber and boards, and reduce the ceiling for heavy timbers, planks and small timbers. These changes were made to enable producing mills and distribution yards, including retail yards, to switch emphasis to output and distribution of the lighter types of lumber. Whereas the demand for heavy timber and planks has fallen off, great quantities of boards and dimension lumber now are wanted for boxing and carting war goods, and for construction and repairs.

FIBER SHIPPING CONTAINERS

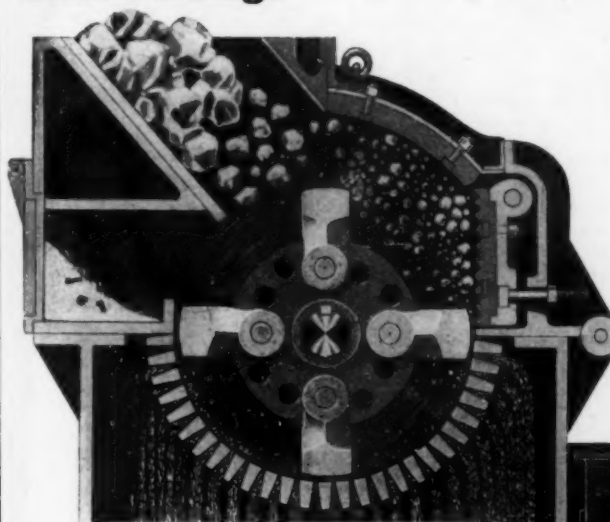
Limitation Order L-317 was amended by WPB on Nov. 23 to make several changes in restrictions covering the use of fiber shipping containers.

CHEMICAL & METALLURGICAL ENGINEERING • DECEMBER 1943 •

WILLIAMS

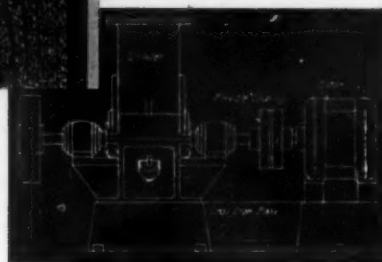
HEAVY DUTY HAMMERMILLS

FOR INDUSTRIAL USE . . . Grind Chemicals . . . Crush 4 feet Cubes of Rock . . . Shred Steel Turnings



Sectional view of Williams over-running hammermill, with heavy liners and grinding plate for limestone and other hard material. Particular attention is directed to the grinding plate adjustment which assures uniform close contact of hammers and grinding plate at all times. Also note the metal trap which provides an outlet for the escape of tramp iron.

Williams Hammer Grinder direct connected to motor, all mounted on heavy cast base. This type of drive is economical to operate and easy to install.



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VEGETABLE MATTER**

Capacity from 50 lbs. to 300 tons per hour

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STAINLESS STEEL PARTS NOW CAST CENTRIFUGALLY

New Method Replaces Forging and Fabricating in Many Cases

HILLSIDE, N. J.—A new method of casting stainless steel centrifugally has recently been developed by The Cooper Alloy Foundry Co. of this city. According to company spokesmen, parts formerly forged or fabricated can now be cast successfully—with resultant savings in cost, man-hours and delivery time.

Cooper has already demonstrated the ability of his new process to crack critical bottlenecks in the manufacture of mass-produced equipment for airplanes. Many such parts are now produced in record time.

Centrifugal casting of stainless steel, however, provides industry with much more than a new way to speed vital war production. It means that either the static or the new centrifugal method can be used—whichever is better, or more economical, or faster.

The Cooper Alloy Foundry Co., where the new process was developed, has specialized in the production of stainless steel, monel, nickel, chrome iron, chrome nickel and other alloy castings since 1922. It offers users of corrosion, heat and abrasion castings a complete alloy casting service—including practical assistance in the selection of alloys.

Concerns interested in the possibilities of this new process are invited by the company to submit descriptions



(with sketches) of the castings, fabricated parts or forgings they now use, together with notes on any special requirements. Company engineers will then make recommendations. Users will not be obligated in any way in taking advantage of this service.

THE Only ALLOY FOUNDRY WITH All THESE FACILITIES

- Laboratory control over raw materials and finished products.
- Dual foundry . . . both hand and machine molding.
- Centrifugally-cast castings.
- Heat treating of castings up to six feet in size.
- Machine shop . . . specially equipped for finishing stainless steel.

- Improved cleaning . . . including Lustra-cast electrolytic finishing which leaves all surfaces bright.
- Castings furnished rough, polished or fully machined . . . one ounce to two tons.
- X-ray and Gamma-ray inspection.
- Development of special alloys to meet unusual requirements.
- Technical consulting service.

THE Cooper ALLOY FOUNDRY CO.

170 BLOY STREET

HILLSIDE, NEW JERSEY

Quota restrictions now provide that in any three months quota period, the total container board content of new fiber-content shipping containers used by a shipper for packaging products listed in Schedule C of the Order shall exceed neither his footage quota nor his tonnage quota for that use. These restrictions do not apply, however, to empty containers used by the Army or Navy, or containers that are quota exempt. In the definition of fiber shipping containers, it is made clear that "0.000 or heavier" qualify the words "solid fiber" and do not refer to corrugated fiber. The amendment permits the use of shipping containers for shipping refractory materials such as insulating firebrick and certain tile products.

PURCHASE ORDERS FOR CRITICAL EQUIPMENT NEEDED IN 1944

Direction No. 2 to Priority Regulation No. 18 was issued by WPB on November 20 stating that purchase orders for a list of specified products, chiefly those of a critical nature, requiring delivery during the first six months of 1944, must be placed before January 1, 1944. Similarly, purchase orders requiring delivery of the same products during the third and fourth quarters of 1944 must be placed before March 1, 1944. This move is designed to permit realistic scheduling of the products involved and does not authorize any person to request delivery in advance of his actual required date. Items in the specified product list include anti-friction bearings, boilers, compressors, heat exchangers, high-pressure blowers, motors and generators, turbines, valves, pumps, etc. Application to place orders after the established deadline for the products must be made in writing by the purchaser to the WPB, Washington, D. C., in triplicate, and must name the producer with whom the purchase order is to be placed. However, authorization under Order M-293 or any other order or regulation of WPB which requires specific authorization to purchase may accompany a late order with a statement to the effect that it constitutes specific authorization to place the order. The requirements of this direction do not apply to orders for listed products required as maintenance, repair or operating supplies, or for second-hand products. Neither do they apply to products listed in Group D of the direction where all orders placed with the producer for the delivery of the same item to the customer in the same calendar quarter do not exceed \$10,000.

WOOD PULP

General Preference Order M-93 was amended on November 29 to place the allocation of wood pulp on a quarterly basis beginning January 1, 1944. Heretofore, WPB has allocated wood pulp on a monthly basis. The changeover to quarterly allocation coincides with a revision of the reports received from the paper industry to include an analysis of the business done by each manufacturer in certain broad classifications of end uses and end users.

NEW PRODUCTS AND MATERIALS

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SEA WATER DE-SALTER

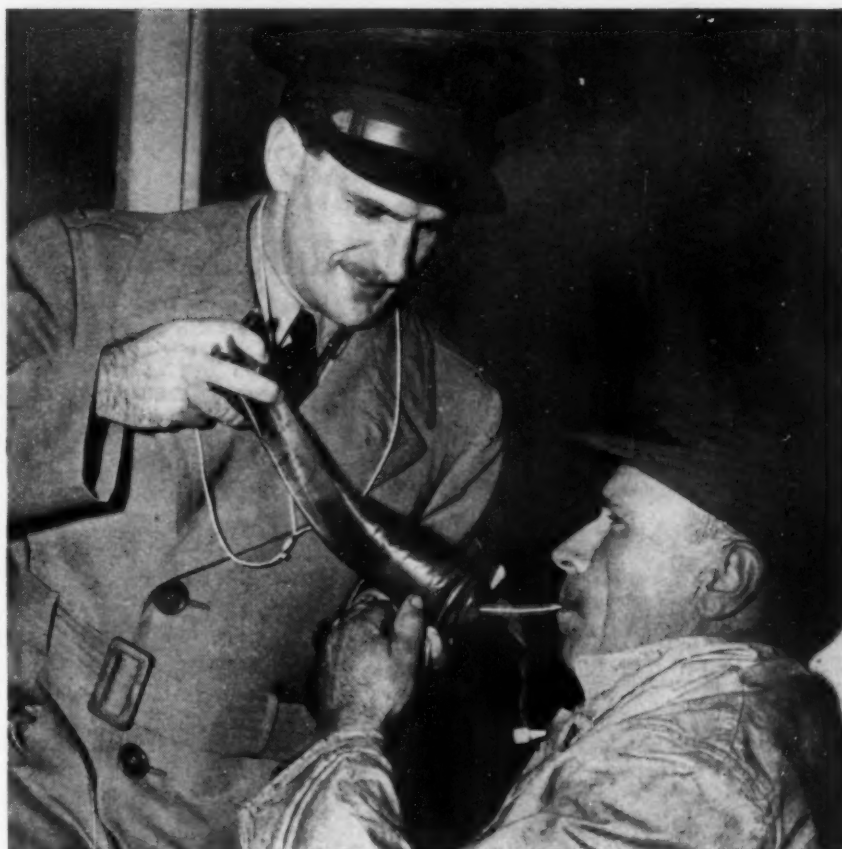
A CHEMICAL DE-SALTER for converting sea water into drinkable water is being produced and packed in 3½ lb. kits by the Permutit Co. of New York. The kit consists of a plastic bag for holding the water, and 14 chemical bricks which are used to purify the water. One brick when disintegrated by the water will produce a pint of drinkable water in about twenty minutes. It is expected that this kit will be of particular use to castaway sailors or aviators who have been forced down at sea.

CELLULOSE INSECT SCREEN

AN INSECT SCREEN of fabricated cellulose has been developed by the Celanese Corp of America, New York, N. Y., it has been announced. An open texture fabric is used containing threads of foil of cellulose acetate or another organic ester of cellulose, twisted to form a continuous spiral thread. The warp and weft threads are joined at their intersecting points. The screen allows the passage of ultra-violet rays, and combines strength with flexibility. It does not require painting, the company claims.

NYLON MOLDING POWDER

THE NYLON INJECTION molding composition made by the E. I. du Pont de Nemours and Co., Inc., Wilmington, Del., named nylon FM-1, will provide as one application, slide fasteners that will withstand rigorous laundering conditions. It will stand up under load at temperatures of approximately 275 degrees F, and withstand cleaning solvents. It can be injected into thin sections, and flows with facility around inserts in molds. FM-1 weighs only 1.14 grams



Seaman drinks sea water that has been purified by new chemical de-salter

per cubic centimeter. It is stated that dies for conventional thermoplastics generally must be modified to compensate for a mold shrinkage of 0.012 inch per inch. Knock-out pins in molds must fit closely and mating surfaces must be ground to attain perfect contact because of the molten character of FM-1 entering the die.

SYNTHETIC DETERGENT

ANNOUNCEMENT is made of a new synthetic detergent raw material by Phillips Sales Co., Montclair, N. J. Philcosol is a dry powder in various strengths. It is said to be effective in a broad range of products including cleaners, bubble baths, textile specialties, hard water soaps and the like.

POLYVINYL ALCOHOL RESIN

THE DUPONT Co. recently announced a polyvinyl alcohol resin characterized by toughness and resistance to oil, grease and many other solvents, now employed in the manufacture of a variety of vital military articles. This plastic, which was introduced shortly before the war started, is now entirely allocated by WPB but is considered to have numerous postwar possibilities. It is stated, for example, that it will be available as a tough, transparent film for gas- and

grease-proof containers, garment covers, hat boxes and lamp shade covers. Also, it is expected to find use in printing rolls capable of withstanding the chemicals in new fast drying inks, for lining fuel tanks, as a paper adhesive, as a thin coating on nylon, rayon and other fibers.

HEAT RESISTANT METHYL METHACRYLATE MOLDING POWDER

A NEW "LUCITE" methyl methacrylate resin molding powder developed by the duPont Company and known as HM-119, is now available commercially. The mechanical, optical, electrical and molding properties of heat-resistant Lucite are approximately the same as those of the general-purpose Lucite. However, the yield temperature of this new molding powder is claimed to be approximately 40 deg. F. higher. It is not recommended for articles which are to be subjected to boiling or to temperatures in excess of 200 deg. F.

CADMIUM PLATING SALT

CADALYTE, a cadmium plating salt, and cadmium anodes are now used for electroplating base metals to provide extreme corrosion resistance, according to the duPont Company. Steel sheets 8 ft. long, over 2 ft. wide and approximately 1 in. thick, are being plated by Thomas-Thiel, Inc. of Wilmington with



SPRAY QUENCHING ARMOR PLATE

Large batteries of Spraco Center-Jet Nozzles are being used by the steel mills to quench armor plate for ships and tanks. Arrangement of the nozzles provides uniform spray distribution and an instantaneous quench over the entire plate surface. Spraco nozzles can be supplied in a wide range of types, capacities and sizes for quenching or any other wartime use.

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a uniform coating of cadmium about 0.02 in. thick. Heretofore, the normal thickness of cadmium electroplating has been 0.0003 in. Cadmium, electroplated on steel, gives an added safeguard against corrosion pits due to the fact that the electrolytic action between the two metals tends to protect the steel preferentially.

STANDARDIZED GASOLINE

DEVELOPMENT of an all-weather, all-purpose, standardized 80-octane gasoline has been announced by the Army. This fuel will be usable in temperatures ranging from zero to extreme heat, eliminating the need for differentiating between winter and summer grades. However, there is an exception in the slightly different fuel requirements specified for extremely cold temperatures. Serving combat needs of all the Army ground force vehicles, the fuel eliminates vapor lock at high atmospheric temperatures, the War Department announced. The gasoline was developed by the Fuel and Lubricants Division, Office of the Quartermaster General, Army Service Forces.

URSOLIC ACID FROM CRANBERRIES

URSOLIC ACID is being produced on a pilot plant scale by Cranberry Cannery, Inc., of Hanson, Mass. It was reported by the U. S. Department of Agriculture that the ursolic acid contained in the cranberry waste material is the highest percentage known to be in any material. This white, flaky resinous acid can be used as an emulsifying agent, is soluble in alcohol and benzene and has therapeutic qualities. It has a high melting point and raises the melting point of other waxes when combined with them. It has been used in the manufacture of cosmetics, as an emulsifier in mayonnaise, and its use in carbon paper is now being investigated. The crude ursolic acid and a brown wax are taken from the skins and refined to give the resin acid and a thermoplastic substance.

METAL PROTECTIVE PAINT PIGMENT

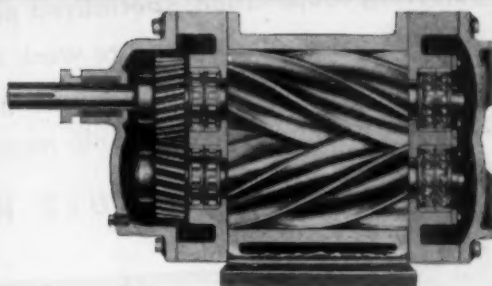
AMONG THE METAL PRIMERS that have entered the market since the war is zinc tetroxy chromate, also known as ZTO Chromate, manufactured by the New Jersey Zinc Co. It is claimed that this product combines rust-inhibitive properties and water resistance, when it is formulated in the conventional linseed oil vehicle used in metal priming. Also, because of its low specific gravity, ZTO Chromate paints have a lesser tendency than heavier metal priming paint pigments to settle on the job. They are expected to find widespread application for shop coats and as primers for the routine maintenance of iron and steel.

ANOTHER SYNTHETIC RUBBER

THE UNITED STATES RUBBER CO. cites six important properties in describing its new synthetic rubber, named Uskol. These properties are, (1) absence of odor in the raw material stage or in the finished product, (2) ability to be vulcanized in several ways to acquire high physical properties, (3) possession

QUIMBY PUMPS

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ROTEX
STEAM
CENTRIFUGAL
CHEMICAL



MAINTAIN INITIAL EFFICIENCY
.....
throughout their
serviceable lifetime.

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View Quimby
Rotax Pump.

PORTER
Rotax Pump
Equipment

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READING

CHAIN HOISTS-ELECTRIC HOISTS
OVERHEAD TRAVELING CRANES

of high tear resistance exceeding that of natural rubber, (4) ability to be used alone or as a blend with other synthetics, (5) resistance to effects of sunlight, ozone and oxygen, above that of any other synthetic, and (6) new high degree of resistance to solvents. Uskol is not suitable for tires, but may, for example, permit the manufacture of rain-coats which can be dry cleaned.

SULPHUR DRUG

SULPHAMERAZINE, a new sulpha compound that simplifies dosage and lowers costs in sulphanamide therapy, was made available recently for general use in the treatment of infections due to hemolytic streptococci, meningococci, pneumococci and gonococci, and supplies of this important new drug are being rushed to all parts of the country. Developed at the Medical Research Laboratories of Sharp & Dohme, sulphamerazine has been subjected to extensive pharmacologic investigation and was studied clinically in the treatment of about 2,000 patients prior to its release.

The chemical name for sulphamerazine is 2-sulphanilamido-4-methylpyrimidine, or monomethylsulphadiazine. In comparison to sulphadiazine and sulphathiazole, sulphamerazine is more rapidly and completely absorbed from the gastrointestinal tract and more slowly eliminated by the kidneys. Thus therapeutic concentrations in the blood and tissues are produced and maintained by smaller or less frequent doses of sulphamerazine as compared to other sulphonamide compounds. This characteristic is an important advantage in the treatment of critically-ill patients who must be disturbed as little as possible. For example, in acute infections requiring four to six doses of sulphadiazine or other sulphonamide daily, the same therapeutic results may be obtained with a minimum of inconvenience to the patient—and at proportionately lower cost—by only two or three doses of sulphamerazine.

REINFORCED PLASTIC

POSSESSING hitherto unattainable strength in proportion to weight, a new material now being employed in aircraft construction was described recently by G. Flayter, vice president and director of research of Owens-Corning Fiberglass Corp., at the annual dinner of the Industrial Minerals Division of the American Institute of Mining and Metallurgical Engineering.

The new material is a plastic reinforced with glass fibers. Experimental samples have been produced with tensile strengths of over 80,000 lb. per sq. in. While the impact strength of ordinary plastics is about 2 ft.-lb. on a standard test, samples of this glass and plastic combination have shown impact resistance of over 20 ft.-lb. Another feature of the new material is that it can be molded into aircraft structural parts with low pressure and without the use of expensive molds. This reduces both the cost of fabrication and the number of man-hours required. The material can be machined and has the dimensional stability of metals.

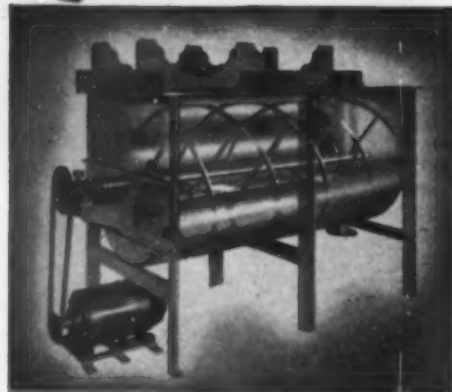
For your new stainless steel and alloy processing units in gauges up to $\frac{3}{8}$ " thick — we offer design and engineering cooperation, specialized plant facilities, manpower especially trained to work with stainless steel and alloys in light to medium gauges. Some production facilities are available now for wartime work.

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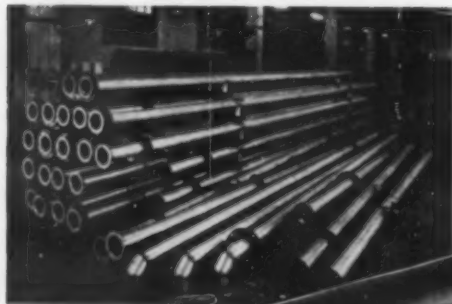


♦ Jacketed Kettle Still—Hand-hole and column flange, with or without agitators. Plate 7015.

♦ Blenders—Available in various sizes with different types of agitators. Plate 1596.



♦ Alloy Piping—Stainless steel welded process piping with built-up Van Stone joints. Plate 7079.



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IN GAUGES TO $\frac{3}{8}$ " THICK

AGITATORS	PANS
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COOLERS	SCOOPS
CONDENSERS	SCREENS
DEHYDRATING EQUIPMENT	SINKS
DIPPERS	STILLS
DRYERS	TABLES
EVAPORATORS	TANKS
HEAT EXCHANGERS	TOWERS
KETTLES	TRAYS
LININGS	TROUGHS
MIXERS	TRUCKS
PAILS	TUBING
	VATS

All orders subject to government
priority regulations

Heat Exchangers—Condenser shell. Plate 7109.

Heat Exchangers—stainless steel tube bundle for condenser. Plate 7108.



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TANKS • KETTLES • CONDENSERS • AGITATORS • EVAPORATORS • PANS • VATS • CYLINDERS • PIPING



SHINE REMOVER

INTENDED for removing shine from clothing, a new chemical formula will be manufactured and marketed by Pettingell & Fenton, Inc., New York, N. Y. The product, Shyn-O-Way, will come in a 16-oz. bottle, packed with a renapping cloth in a strong carton. Tests conducted by the United States Testing Co. indicate that the fluid can be used on both clothing and fabric upholstery without injury to the fabric. The composition is a discovery of Prof. R. H. McKee of Columbia University.

SULPHA-IODINE COMPOUNDS

DISCOVERY of new sulphur-iodine compounds which destroy spore on cultures of tetanus, gangrene and anthrax, has been announced by Dr. Paul Goodrich of the research department, Rutgers University, College of Pharmacy, Newark, N. J. It is said that they were formed by inter-action of the sulphur drugs with iodine. None of the sulphur compounds in use at present exhibits any germ killing action on bacteria cultures in laboratory tests. The new compounds are effective against all types of organisms. He also reported the extraction of two additional types from the parent sulphur-iodine compound which contain no iodine but apparently are iodine-activated because they exhibit both bacteria and spore killing action on cultures of various organisms.

SULPHUR STRIPS

IMPROVED strips of sulphur are now available for sulphuring wine and syrup barrels or other containers requiring fumigation. One of the Kobbe sulphur strips will thoroughly fumigate a 50-gal. barrel, it is said. A hole is punched in one end of the strip which is suspended on a hooked wire and lowered through the bung. They do not drip and will not contaminate the barrel with falling ash. An effectively high concentration of sulphur dioxide gas is generated by these strips in the fumigation of closets, staterooms, lockers or other confined quarters. One or more strips are suspended on a wire or stuck upright in a container of earth or sand. They are also very effective and convenient for sulphuring home dried fruits. They were developed by Kobbe Laboratories, Inc., New York, N. Y.

INSECT REPELLENT

AMONG the new developments of the Shell Chemical Co. is Crystox, a compound highly caustic to flies and other insects, and used for biological applications. It is important now because of the shortage of insecticides.

VINYL RESIN SHOE SOLING

SHOE SOLING MATERIAL of light and flexible vinyl resin is now being manufactured by the B. F. Goodrich Co., it has been announced. At the present time this material is strictly a war material, but shows extraordinary resistance to wear. It is expected that when prime materials are again available, shoe soles made from this resin will show

an even greater resistance to wear. Its unusual strength will enable shoe manufacturers to turn out shoes which are lighter and more flexible than could previously be made. In addition, the soling can be made in any color desired.

ALCOHOL-SOLUBLE NITROCELLULOSE

IN ORDER to ease the shortage of ester solvents, Hercules Powder Co. chemists have developed a new grade of nitrocellulose having greater solubility in alcohol. Requiring a minimum of ester solvents, SS nitrocellulose is finding wide application in the production of high quality lacquers. Tests indicate that the SS nitrocellulose, which is available in four viscosities ($\frac{1}{2}$, $\frac{1}{4}$, $\frac{5}{8}$ and 40/60 seconds), can be used in wood sealers, wood lacquers, printing inks, heat-sealing adhesives and for other special uses. Hercules reports that SS lacquers possess the same properties as standard nitrocellulose lacquers, including quick-dry, flexibility, toughness, durability and chemical resistance.

CONTROLLED PLASTICS

IN ANNOUNCING Emeloid, their new plastic product, the Emeloid Co. of Arlington, N. J. state that it is a controlled plastic, capable of possessing varied controlled characteristics similar to those brought about in steels when made in different alloys. Obtainable in either clear or assorted colors, it is claimed that this plastic can be formed, molded, shaped, cut, sheared, sawed, punched, pierced, stamped, polished, drilled, machined, lithographed and printed.

THIN VINYL PLASTIC FILM FOR COATING AND PACKAGING

THIN UNSUPPORTED films of vinylite plastic for use as paper and cloth coating, and as a heat-sealing waterproof packaging material have been developed by the Plastics Film Corp. The films are made from suitably modified vinyl chloride-acetate resins, in continuous rolls up to 54 inches wide, ranging from 0.00025 to 0.005 inches in thickness. Properties obtainable with other forms of vinyl chloride-acetate plastics can generally be duplicated, and the film is available in both clear and pigmented types varying from stiff, papery to limp, rubber-like compositions, depending on the formulation. Although all of the films are thermoplastic, certain types will withstand boiling water without becoming sticky and without delaminating when heat-sealed.

COMBINATION SOLVENT AND ALKALINE CLEANER

RUNNING GEAR, an emulsifiable type cleaner designed for quick removal of oils and solid particle dirt and greases, has been announced by the Technical Processes Division of the Colonial Alloys Co. in Philadelphia. It may be used as a solvent either in an open tank or in a degreasing machine, to be followed by an alkaline dip for purposes of plating, anodizing, etc. When used alone without a subsequent water bath, it will efficiently remove thin oil and grease film, according to its manufacturers.

In These Pumps the Impeller is Fitted to the Material to be Pumped

Just as no one type of pump meets all requirements, Amsco pump engineers hold that no single design of impeller meets all service conditions. Loadings vary and an impeller that might afford high hydraulic efficiency in the handling of thick slurry would not necessarily assure the same efficiency in handling water-borne slag, gravel or coal screenings.

Amsco pump engineers have designed five types of impellers, each for handling loadings within a given range.

The Class "D" impellers shown are recommended for use where loadings are highly abrasive. Note the wide clearance between the shrouds. The two-vane unit, of course, more readily handles larger particles than the four-vane unit. The Class "H" is for more finely divided solids. The Class "W," not often recommended by us, is preferred under some circumstances. For use where the pumped material is erosive or corrosive rather than severely abrasive, the Class "S" impeller was designed, and recently patented (U.S. Patent No. 2,265,448). Abrupt changes in velocity or direction of flow are eliminated by this design, thus avoiding localized

wear. This class of impeller lends itself to the handling of slurries and heavy chemicals.

Choice of impeller is only one feature of Amsco-Nagle pump design. These unusual pumps exhibit sound engineering throughout. Every construction and design detail has been carried to a logical conclusion.

Amsco-Nagle pumps are made in five types. There are two horizontal shaft types: Type "A," a single stage, self-priming unit; and Type "T," a single stage side suction pump.

The three vertical shaft types include: the Type "QW," a wet pit, shielded bearing pump with inverted inlet; the Type "SD," a dry pit, standard bearing pump; and the Type "SW," a wet pit, standard bearing pump with inverted inlet.

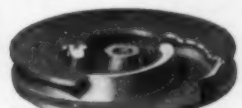
Bulletin 940 covering Amsco-Nagle Centrifugal Pumps for industry more adequately discusses the proper design and correct selection of pump impellers.



Class "S"
Four-Vane Shrouded Impeller



Class "D"
Two-Vane Shrouded Impeller



Class "D"
Four-Vane Shrouded Impeller



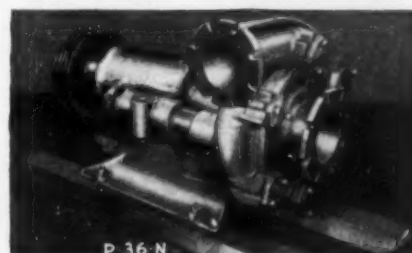
Class "H"
Six-Vane Shrouded Impeller



Class "W"
Four-Vane Open Impeller



P-98-N Amsco-Nagle
8" Type "QW",
frame 24, vertical
shaft pump (without
motor) for use in a
nickel-ore treating
operation.



P-36-N Amsco-Nagle
4" Type "T", frame
19, horizontal shaft
pump for handling
slurry in lime prod-
ucts plant.

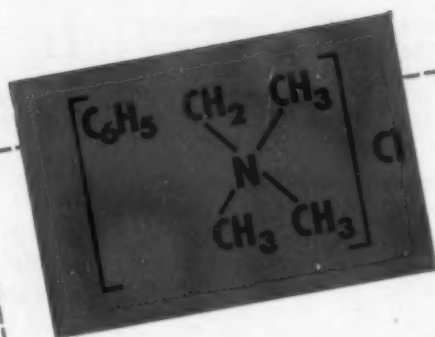


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If you need a quaternary ammonium salt, we recommend a thorough examination of this compound—its properties and reactions.

Anhydrous Benzyltrimethylammonium Chloride is stable up to approximately 137° C... but on further heating it decomposes to form benzyl chloride and trimethylamine. The anhydrous salt is extremely hygroscopic—hence Benzyltrimethylammonium Chloride is sold as a 60%-62% aqueous solution. It is now available in moderate drum quantities for essential uses. Samples will be supplied on request.

PROPERTIES OF BENZYLTRIMETHYLAMMONIUM CHLORIDE

IN PURE ANHYDROUS FORM:

Molecular Weight	195.7
Color	White
Melting Point	137.0°C, d
pH of 0.1 M aqueous solution, 25°C	5.4

IN 62% AQUEOUS SOLUTION:

Specific Gravity, 20°C/20°C	1.07
Refractive Index at 20°C	1.472
Freezing Point, °C	<-50
Viscosity, 25°C	6.36 centipoises

TABLE OF SOLUBILITIES: (g. solute per 100 g. solvent)

Water	411
Ethanol, 95%	103.5
Butanol, C. S. C.	32.7
Dibutyl Phthalate	0.1
Tributyl Phosphate	0.1
Butyl Lactate	20.0
Ethyl Ether	Insoluble
Petroleum Ether	Insoluble
Benzene	Insoluble
Ethyl Acetate	Insoluble

CSC

COMMERCIAL SOLVENTS

Corporation

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PERSONALITIES



Thomas M. Rector



E. N. Woodbury

♦ **THOMAS M. RECTOR** has been elected General Foods Corp. vice-president in charge of research and development. He has been director of engineering research since 1932.

♦ **J. F. BECHTLE** has joined the Standard Steel Corp., Los Angeles, as assistant general manager. He was formerly connected with the metallurgical and research department of M. W. Kellogg Co. in New York.

♦ **WILBUR H. ARMACOST** has been elected a vice-president of Combustion Engineering Co. to succeed the late F. H. ROSENCRANTS. He will continue to supervise the design of industrial superheaters and economizers, as well as forced-circulation boilers, and will be responsible for the chemical recovery units and steam generators.

♦ **STEPHEN LAUFER** has been elected assistant vice-president of Schwarz Laboratories. In that capacity he will be in charge of brewing technology. **EARL D. STEWART** has been appointed director of research to carry on the research program inaugurated under Dr. Laufer's leadership.

♦ **WILLIAM G. THEISINGER**, who has been director of welding research at Lukens Steel Co., Coatesville, Pa., since February, 1941, has been appointed assistant to the vice-president. Dr. Theisinger will assist in work connected with the manufacture, sale and application of special products such as clad steels.

♦ **H. V. ALLEN, JR.**, has joined the Atapulgus Clay Co., in Philadelphia. He formerly was with the Metal & Thermit Co.

♦ **GEORGE M. WATSON** is now at Cuatro Ciénegas, Coahuila, Mexico. Dr. Watson is connected with the guayule rubber manufacturing plant of the General Tire & Rubber Co.

♦ **E. N. WOODBURY** has been appointed assistant to F. M. THOMPSON, JR., company entomologist of Hercules Powder Co. Dr. Woodbury will work especially on Thantite and other synthetic toxic agents for insecticides.

♦ **LEO LEHR CARRICK**, since 1927 dean of the School of Chemical Technology of North Dakota Agricultural College, has been appointed director of red lead research and consulting chemical engineer of the Lead Industries Association. He will make his headquarters at the Association's office in New York. Dr. Carrick has had a long career in paint technology and is widely known for his investigations and publications on the subject.

♦ **F. W. WARNER** has been appointed assistant engineer of the Plastics Divisions of General Electric Co. **G. A. GUSTAFSON** has been made manufacturing manager of the divisions.

♦ **HERMAN R. THIES**, former assistant manager of the Goodyear Research Laboratory, has been appointed manager of the Goodyear Tire & Rubber Co.'s newly organized Plastics and Chemical Sales Division at Akron.

♦ **E. A. BERTRAM** has recently been appointed general manager of Heat Transfer Products, Inc., New York. Prior to his new association he was chief engineer of the heat exchanger department, The Lummus Co., and was previously connected with Alcoa Products, Inc. Mr. Bertram is a graduate of the University of Illinois and is a member of the American Institute of Chemical Engineers.

♦ **MILTON J. MAGUIRE** has been appointed resident manager of the Portland, Oregon, office of Hercules Powder Co. Mr. Maguire, who succeeds the late A. C. DUNCAN as head of the Paper Makers Chemical Department office, has been assistant manager of the company's PMC plant at Holyoke, Mass., since 1939.

♦ **HARRY S. TWEEDY** is now manager, Field Service Division, Detrex Corp. Mr. Tweedy has been chief inspector of production in all Detrex plants since December, 1940. Prior to that he served for four years as a design engineer.

♦ **J. GRANT-MACKAY**, formerly with Jefferson Island Salt Mining Co., has joined the research and development department staff of Pennsylvania Salt Mfg. Co. Other recent additions to this company's research and development department staff are: **FRANCIS E. MURPHY**, formerly with General Chemical Co.; **HERBERT E. RICKS**, formerly with Gutham Radio Co.; **W. C. WOLFE**, formerly with Petroleum Chemicals, Inc.; and **ALFRED H. POPE**, formerly with General Chemical Defense Corp.

♦ **G. E. CARPENTER**, vice-president of the Carpenter Paper Co., has been appointed consultant to the Paper Section of the Office of Civilian Requirements.

♦ **HENRY G. BOON**, of Neenah, Wis., has been appointed Deputy Director of the Fine Paper Branch of the recently organized WPB Paper Division. Mr. Boon will have supervision of the Newsprint Section, the Groundwood Paper Section, the Book Paper Section, and the Writing Paper Section. His long experience as general superintendent of the Kimberly Clark Corp. will be of value to the WPB and the paper manufacturers.

♦ **ROBERT T. DUNLAP** has been appointed assistant to the president of Wickwire-Spencer Steel Co. Mr. Dunlap is well known in the steel industry as an authority on plant installations, production and operation. He will be located at the company's home office in New York.

♦ **JOHN H. STAIGER** has joined the metallurgical staff of Michiana Products Corp., Michigan City, Ind. Since graduating from Purdue University in 1936, Mr. Staiger has been engaged in metallurgical engineering work and was, until recently, metallurgical engineer with LaSalle Steel Co. of Hammond, Ind.

♦ **KURT W. RENSON** has joined the Los Angeles laboratory staff of Turco Products, Inc. Mr. Renson graduated in 1930 from the College of Industrial Chemistry in Vienna.

♦ **JOHN J. JAKOSKY**, former dean of the School of Engineering and Architecture at the University of Kansas and director of the experimental station, has been appointed an assistant to the president of the University of Southern California.

♦ **W. W. VOGT** has been appointed as manager of the tire and chemical divisions of the development department of Goodyear Tire & Rubber Co. Mr. Vogt

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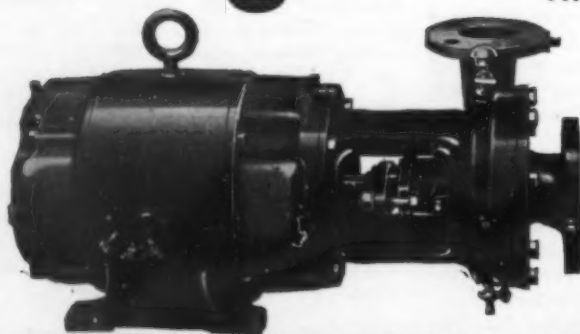
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will be responsible to Dr. R. P. Dinmore.

♦ ROBERT I. JAFFEE, research metallurgist, has been appointed to the technical staff of the Battelle Memorial Institute, Columbus, Ohio. He was associated with Leeds & Northrup Co.

♦ WARREN H. HAY has joined the engineering staff of Industrial Research Service, Dover, N. H. Mr. Hay, a graduate in chemical engineering from the University of New Hampshire, was employed by the Celanese Corp. at its Cumberland, Md., plant until he resigned to join Industrial Research Service.

♦ WALTER E. SCHEER has been appointed to the staff of Ameco Chemicals, Inc., Rochester, N. Y., and will be in charge of the company's new branch office in New York. Mr. Scheer, formerly employed by the Commercial Solvents Corp. in the Technical Service Division, will handle technical and sales work in connection with the products made by Ameco Chemicals.



Thomas T. Watson

♦ THOMAS T. WATSON, who has been research metallurgist of the Research Department of Lukens Steel Co. since 1939, has been appointed director of research of Lukens and its divisions, By-Products Steel Corp. and Lukens Weld, Inc. At the same time announcement was made of the appointment of D. BRUCE JOHNSON as assistant to the director of research and SAMUEL D. LEMMON as research metallurgist.

♦ WILLIAM E. PHILLIPS has been appointed vice-president of the Merchants Chemical Co. Mr. Phillips, a graduate of Louisiana State University, was formerly Chicago district manager for Mathieson Alkali Works. He will be located in the Chicago office of Merchants Chemical Co.

♦ BENJAMIN J. LAZAN, chief engineer of the Sonntag Scientific Corp., Greenwich, Conn., has been given the Alfred Noble Prize for 1943 for the most outstanding research work in any field of engineering. The prize was awarded to Mr. Lazan for his paper on "Some Mechanical Properties of Plastics and Metals Under Sustained Vibrations." The presentation took

place at the annual dinner of the American Society of Mechanical Engineers in New York.

♦ HARRY J. STURM has been added to the administrative department staff of Quaker Chemical Products Corp. Mr. Sturm is a graduate of the University of the South, and a veteran of World War II. He served in the Army of the United States from Oct. 2, 1941, to Sept. 7, 1943, when he was honorably discharged.

♦ W. H. STEINKAMP has been appointed assistant general sales manager of the Brown Instrument Co., a division of Minneapolis-Honeywell Regulator Co. During the past years Mr. Steinkamp has represented the Brown company in several of the Eastern cities where he served as branch manager. He will make his headquarters at the company's main office in Philadelphia.

♦ CLAUDE H. SMITH, chemical engineer in the development department of Good-year Tire & Rubber Co., Akron, Ohio, has been appointed plant manager of the make his headquarters at Philadelphia.

♦ KENNETH S. PITZER of the faculty of the University of California at Berkeley won the \$1,000 prize of the American Chemical Society given in recognition of accomplishments at the recent meeting in Pittsburgh. Dr. Pitzer has been doing research work in the field of chemical thermodynamics.

♦ WALLACE A. CRAIG is now employed by the Vega Aircraft Corp. as process engineer in their Burbank, Calif., plant. He is specializing in problems concerned with fuels, lubricants and hydraulic oils.

♦ D. A. BUNCE has been appointed superintendent of the Mansfield, Mass., plant of Hercules Powder Co.

♦ Z. C. LOEBEL has resigned from the General Chemical Co., Department of Technical Surveys, to accept a position with Dr. Charles L. Mantell, consulting chemical engineer, New York, N. Y.

♦ M. VAN WINKLE has left the Pennsylvania State College to become a member of the staff of the Chemical and Metallurgical Engineering Department of the University of Michigan.

♦ W. S. CALCOTT has been appointed to the position of assistant chemical director in charge of development of the Organic Chemicals Department, E. I. du Pont de Nemours & Co. Dr. Calcott since 1931 has been director of the Jackson Laboratory and the semi-works plant operated at the du Pont Dye Works, at Deepwater, N. J. John Marlin Tinker, assistant director since 1938, has been appointed director of the laboratory and semi-works. Dr. George Edward Holbrook was advanced from head of the New Products Division to assistant director.

♦ M. ERNEST GRAHAM has been appointed to the research staff of Battelle Memorial Institute, Columbus, Ohio, and assigned to its division of non-ferrous

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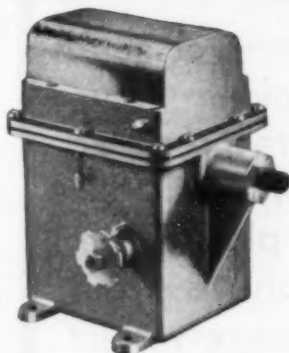
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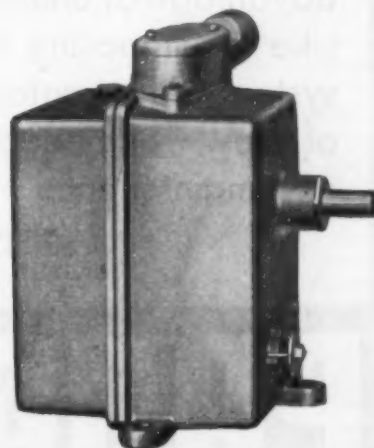
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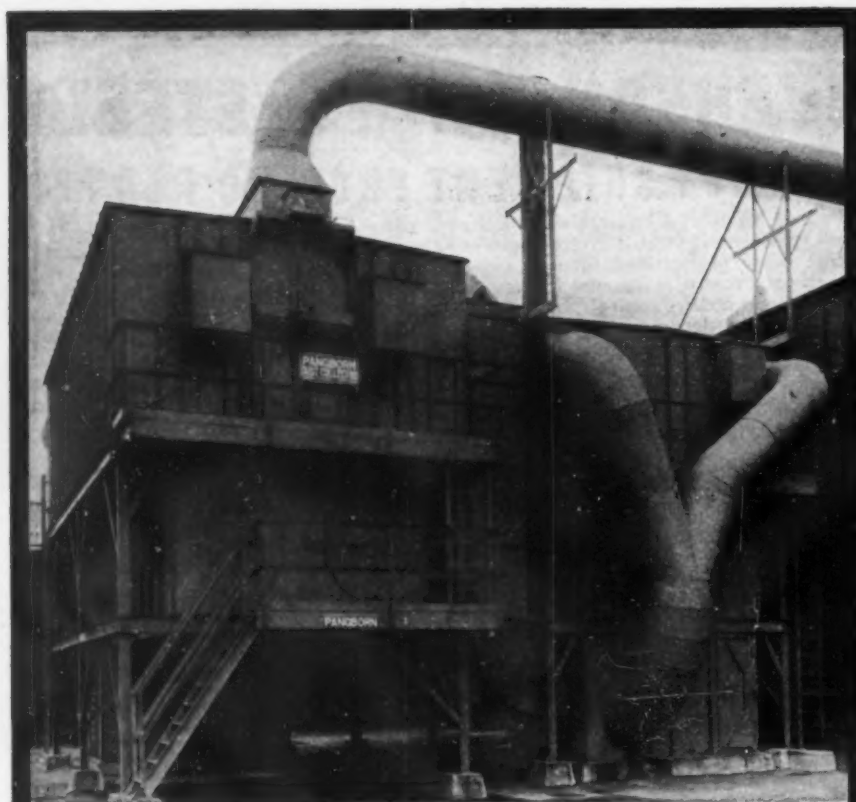


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metallurgy. Mr. Graham, who was formerly associated with the Niagara Alkali Co., is a chemical engineering graduate of the University of Cincinnati.

♦ LOUIS L. SHAPIRO has been appointed plant manager of Glyco Products Co., Brooklyn, N. Y. Mr. Shapiro was graduated from Franklin and Marshall College with the degree of B.S. in chemistry and later received his degree in chemical engineering from the Drexel Polytechnic Institute.

♦ PAUL MAYFIELD, director of sales of the naval stores department, Hercules Powder Co., has been appointed assistant general manager. Mr. Mayfield, who joined Hercules in 1926, as a chemist, has served as naval stores sales director since 1939.

♦ H. F. DU PONT has resigned as a member of the finance committee of E. I. du Pont de Nemours & Co. A member of the finance committee since 1916, he wished to be relieved of some of his business connections. He retained his membership on the board of directors which he has held since 1904.

♦ WILLIAM S. RICHARDSON has been named head of the newly-created chemicals division of the B. F. Goodrich Co., Akron, Ohio. He has been with the company since 1926 and since 1942 he had been serving in the capacity of general manager of industrial products and sundries sales. E. F. TOMLINSON will succeed Richardson as general manager of the company's industrial products sales division.

♦ FRED L. WOLF has been appointed executive vice president of the Ross-Tacony Crucible Co., Tacony, Philadelphia. He had been connected with WPB as Deputy Director of the Mica-Graphite Division of the Minerals Bureau.

♦ L. C. TURNOCK, consulting chemical engineer with offices in Cleveland, has been appointed special consultant to the office of the chief of the chemical warfare service of the War Department. His duties will be both in Washington and in the field.

OBITUARIES

♦ EDGAR V. O'DANIEL, vice-president and director of American Cyanamid Co., died in New York City on November 4. He had long been associated with chemical enterprise, including former work with Air Nitrates Corp. and National Carbide Corp.

♦ CARL H. SONNTAG, a specialist in construction and operation of cement plants, died in a Cleveland, Ohio, hospital July 30. He was 64 years old, Mr. Sonntag, who retired from the managership of the local plant in 1939, had just returned from managing a cement mill in Puerto Rico.

♦ RALPH N. MAXSON, professor of chemistry at the University of Kentucky, died of a heart attack on August 18. Dr. Maxson was 53 years of age.

FROM THE LOG OF EXPERIENCE

Dan Jutleben, Engineer

DURING THE RAINY MONTHS in San Francisco, the chronicler's basement provided the locale for the relief of the surplus energy of the neighborhood boys. As interest in one activity successively waned, fresh projects had to be ready for immediate assumption. Mother and grandmother did most of the thinking but now and then some variety was sought by appeal to the "old man." Boys are born to be busy in mind and body. The important thing is to lead the busyness along healthful lines. When shooting marbles becomes the infection, the family shoots marbles. When the teacher has inspired interest in the collection of flowers for pressing, the family takes to the woods. All of the various youthful obsessions; baseball, kodakery, stamp collections, in their regular turn, become important family activities. Sometimes mother is hardput to devise a means to divert an unsalutary impulse without the aid of a pain-inflicting agency. The patience of grandmother dispels the gloom of a rainy day.

AN ARTIFICE had to be invoked to instill attractiveness to the hard dry breakfast toast or to the spinach and carrots at dinner. In this case the expedient was provided by a contractor's operation on Market Street where some time was spent with the boys in sidewalk supervision. Some of the excavated rock was sent through a crusher while the rest was steam-shoveled into wagons. Subsequently, for crunching the toast, the rock crusher was simulated with the accompanying noise—and grandmother had to join even though it was painful. The spinach was hoisted with the steam-shovel amid more or less vigorous puffing. By the time the objective had been achieved, the technique was revised to conform to the conventions.

WHEN THE MERCHANDISING URGE infected the boys, selling candy bars offered an attractive alternative to doing chores for their nickels. First they had to learn that a retailer had to buy at wholesale and earn the difference by providing the retailing service. They couldn't buy the bars from the neighborhood grocer for a nickel and sell them for six cents. Accordingly, a visit was made to a wholesale confectioner's where a selection was made aggregating about \$15.00 in cost and the boys accepted this sum as a lien against their business. For a while the basement was an active place. The bars, costing 3½ cents, sold for a nickel. The proprietors learned that they could not withdraw materials from the shelves for personal use without paying out of their own pockets just as was expected of any other customer, especially as their ownership was subject to the heavy mortgage of \$15.00. However, when the stock was sold out, their

curiosity had been satisfied. They paid their debts and banked the profits. They learned the facts underlying the Hebraic limerick, to wit "Buy low, sell high, that is the yiddisher lullaby." They furthermore acquired some other impressions. When it came time to enroll as college freshman 12 years later, mother issued with the railroad ticket, a check, all in one lump, to cover the entire year's needs. During the four years, both ends always met in June without the infliction of the embarrassment of writing home for a deficiency appropriation.

SUDDENLY, THE PUBLISHING BUSINESS became the obsession. They decided to print a "Saturday Morning News." There was available at the office an old typewriter and a mimeograph. Capital was accumulated by selling a \$5.00 share of stock to each of the dads. At the first meeting of the editorial directorate around the dining room table, Jack Warde, age 10, was elected Editor in Chief, Victor, the sleight-o'-hand performer was in charge of the domestic science department. Don, aged 6, was advertising manager and his duty was to bewitch the neighborhood merchant out of four-bits for advertising announcements. There was a full corps of reporters who rang door bells and collected news of household trivialities. There was a lot of enthusiasm and the business maintained solvency. The "News" was distributed free. The commonplace doings written in the eager zeal of the boys attracted a demand so that the accidental missing of delivery brought a telephone call. The boys learned the important lesson of their obligation to the subscribers. "The show must go on." However, with the coming of Spring, the responsibilities interfered with other affairs and the routine publication of the "News" began to develop some drudgerous qualities. Procrastination set in and the work was put off till Friday night! Then there was a great stew. The staff sat around the table and evolved a little editorial. Somehow some writing had to be produced to fill the interstices between the advertisements. The chronicler (being one of the dads) suggested the fabrication of some news items, i.e. fictitious episodes woven out of the imagination. The boys exhibited an aversion to such an unethical proceeding. Deception had not yet been accepted as a tool of occasional convenience—"right or wrong" as the Midshipmen put it. There comes a time when assistance is craved for letting go as well as for initiating and so relief was brought about by suggestion that announcement

be made of the temporary suspension of publication due to pressure of other affairs!

THE NEWS HAWKS had gathered many an anecdote. A few, because of their freshness, were not available for publication lest their disclosure cause distress. Good neighbor Hiram "Blank" had departed from Chicago a goodly number of years ago leaving behind two sons and carrying with him a monthly alimony liability which he dutifully discharged. In San Francisco he built up a successful printing establishment and then took unto himself a school teacher of superior qualities with whom he lived in happiness and contentment. Her age was about equal to that of his eldest son in Chicago. As the years rolled along, death overtook Hiram. His son came out from Chicago to attend to matters of estate. He became enamoured of the stepmother and the two were married amid the congratulations of a large circle of friends. There was no change in name or corporate management.

A LITTLE FURTHER DOWN the hill dwelt old man Coulter, a Market Street Railway employee pensioned after a long and faithful service. His daughter, having a degree of Doctor of Philosophy from the University of California, was an inefficient housekeeper. Her husband, also a PhD, earned the household necessities to some extent by serving as a professor in an educational institution. He was a gentleman of the first water and with top hat, cane and spats, he looked the part. The income wasn't large but under the benefit of the pooling of interests in the old man's house, fiscal matters rode upon an even keel. By an arithmetical reasoning, the professor and his wife arrived at the conclusion that they were not mutually complementary and accordingly they negotiated legal separation. He continued, however, with congeniality to participate at Sunday dinner with the former wife, their son and old Grandfather. Later, the former wife married a young man who was employed as a street car operator. The ex-husband maintained widowed singleness but continued his friendly Sunday dinner convention with his successor and family.

A PAYDAY AFTERMATH shows why the plant engineer gets gray hair and goes to an early grave. One of the riggers who was assigned to a job in the bonded warehouse in the rum plant across Delaware Avenue got his envelope from the paymaster at 11 o'clock and couldn't get back to the job without pausing at the corner tavern. The foreman lost him and marked his time card AWOL. As the watchman made his rounds before locking up, he heard a commotion in the rectifying room where barrels of four-year old "high wine" released from the



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WORK in process is quickly shunted from one machine line to the next in this effective Standard Conveyor installation. The transfer table in the foreground consisting of a section of roller conveyor mounted on wheels, provides quick easy means of shifting the work-pieces from one line of roller conveyor to another. Two machine lines are thus continuously fed with work — without halt or interruption and with a

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government bonded warehouse, are stored for next day's rectification and bottling. There was our lost rigger groping for the way out! The rigger was still able to stagger. He had forgotten his name and his wallet was gone but he had not lost the homing instinct.

THE DOOR-KNOB ALIBI is receiving some competition. Yesterday Bill Mooney came in with a pair of "beautiful" shiners, extra dark in color. He "explained" that the family doctor had diagnosed it as an infection due to the bite of a rare insect! On the other hand Old Rastus (age 50) came in on the morning after pay day with his right eye bulging like an egg. The foreman wanted to know how it happened. Answered Rastus, "Boss de wife done hit me."

BOB WEBSTER, the construction engineer on the Pennsylvania Sugar Mill, 18 miles west of Miami, Florida, erected more sugar houses than any other man dead or alive. He was Dyer's general superintendent and set up houses in Canada, Mexico, South America, England, North America and California. One day he drove into Miami and there met a high-powered real estate man. The twain took a few snifters, and Bob reached that bold stage under which a mouse once challenged a cat. He had his check book in his pocket—which was a hazardous circumstance. The real estate salesman thereupon exchanged a grapefruit orchard for a \$3,500 check. On the gray dawn of the next day, Bob observed the check stub and noted that he was now an orchardist. He hastened to stop payment on the check, but it was too late. Bob's slight indiscretion might have ended tragically, but instead, it wound up after the manner of the conventional love story. Before Bob's job at Miami was finished he sold his orchard for \$5,500.

BOB WAS SENT to England about '26 to erect 3 beet sugar factories. The British trade union rules got into his hair! On the Fourth of July he celebrated copiously, unfurled the American flag from the peak of the pan house roof and sent the entire British crew off for a holiday. He would permit no desecration of the anniversary of the great day when the Americans announced independence from the British. On the "morning after", the escapade was forgotten and work was resumed. Fortunately the in-born British sportsmanship avoided an international incident!

DURING A SLACK PERIOD in refining operation, we made some construction work for a crew of operators. The kind of men who grow contentedly into repetitive operating jobs are lethargic, or get that way. Their minds ruminate while their hands perform reflexively. Thinking becomes distressful. They cannot originate a train of thought to direct their hands against a diverse performance. And so their accomplishment is disappointing. Complaint to Señor, the master distiller that his crew was useless brought the reply that in Spain they shrug their shoulders and say "You

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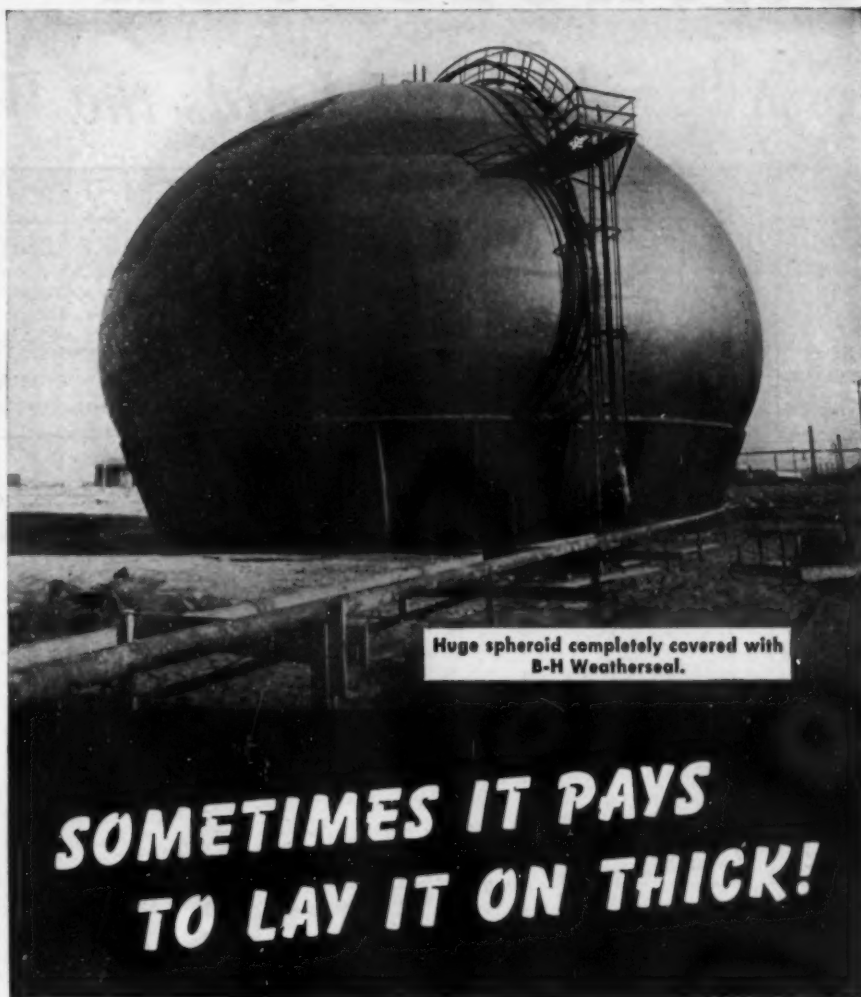
have to plow with those oxen!" About 20 years ago Henry's old melter operator performed with exemplary faithfulness. Accordingly Henry promoted Teodor to another job that required some slight exercise of the head and for which the emolument was increased by a nickel an hour. In a few days, the workman requested permission to return to his old job at reduced pay.

THE CONSTRUCTION ENGINEER used to be king before the application of present day regulations. Jim Malone was in charge of the Blissfield, Michigan, job in 1905 when hiring was an important formality. Determination of the rate of pay was accompanied by preliminary bargaining and jockeying with the boss in the position of advantage. During an interview with a prospective pipe-fitter, Jim explained that he had three classifications, respectively A, B, and C. When an applicant claimed skill under Class A, Jim would argue him down to Class B, and when he had succeeded in satisfying him, he would start all over again. Jim then expressed doubt as to the applicant's ability to function under Class B. After all, the requirements of Class B may be beyond the applicant's capacity. Under Jim's persuasive manner, the applicant was finally happy to accept classification C. Jim's A and B were mostly fictitious.

TWENTY YEARS LATER, before the law of "supply and demand" was modified by the law of collective bargaining, Bill Booth on a blue Monday was displeased with the work of his power plant crew. When Boss W. H. adventitiously passed by, Bill relieved his feelings with the explosion that he was about to fire every man in the boiler house! W. H. calmed him down with the suggestion that he had "better be . . . good and sure he has another crew on hand before he fires the old one!"

NEIGHBOR MALONE complained that a long-geared man wearing glasses and a brown hat tossed a block of wood out of the 5th floor window and registered a near miss among his crew of workers below. He said he could come over and identify the culprit. These facts were posted on the bulletin board, and the next day the culprit "gave himself up." He said a steel pivoted sash had been blocked open and just as he passed, a gust of wind jarred the sash, and allowed the block to fall. He stuck his head out to see what had happened and was thus identified. The "culprit" was the assistant superintendent. The bulletin board was promptly cleared of the indictment.

DOC'S POST GRADUATE residence in Berlin yielded pleasant experiences. The heavy tasks laid down by the Master demanded an occasional stimulant. He observed that the personal flask which he stored in the bureau drawer suffered a daily recession of the liquid level and he locked the drawer. When he returned in the evening, his landlady took him severely to task for his insulting insinuations.



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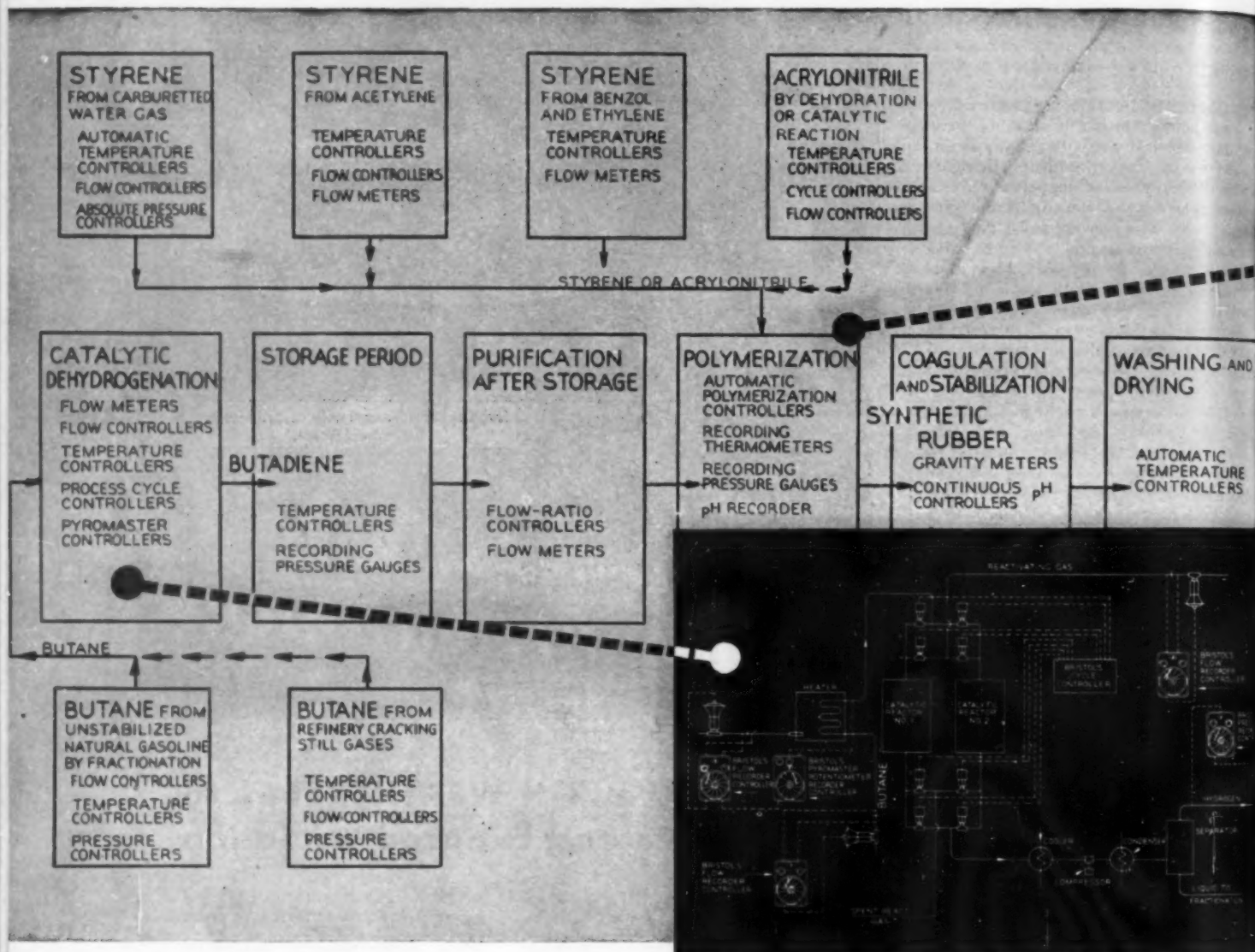
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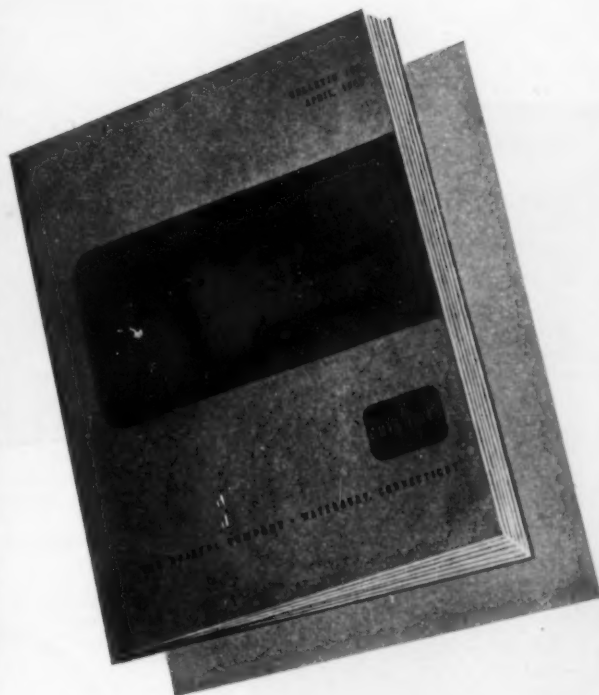
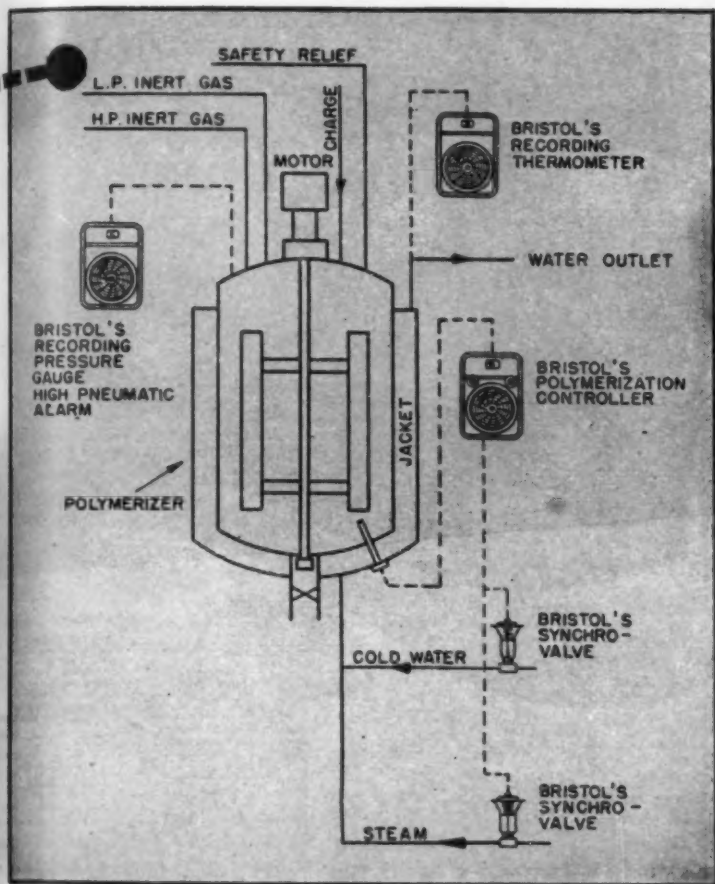
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Automatic Controls for Synthetic Rubber Processes



Write for Bulletin 103 on Bristol Controls for Synthetic rubber production.

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tion — Bristol's Polymerization Controller — solved this problem, holding temperatures rigid at correct control points, regardless of variations in operating conditions, and in quantities of cooling medium required.

BRISTOL

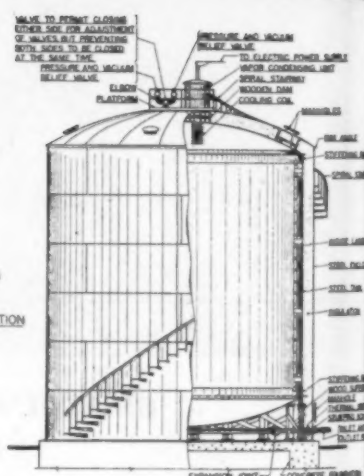
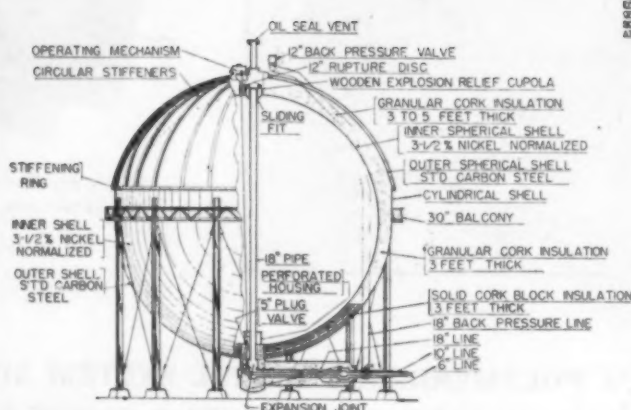
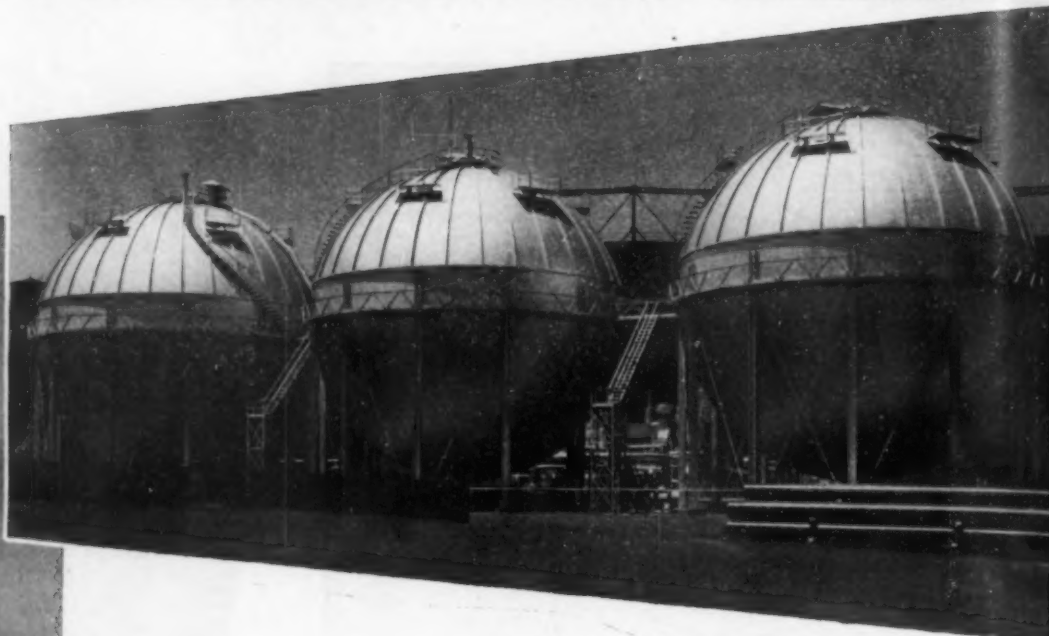
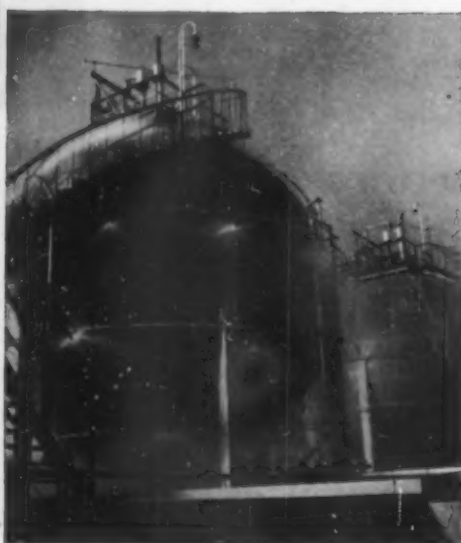
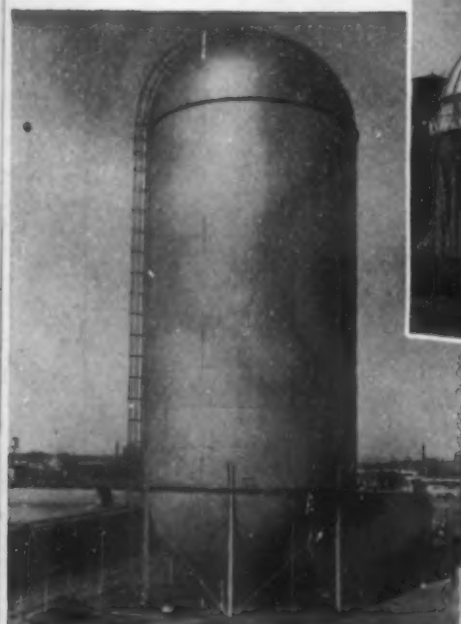
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MEETINGS AND CONVENTIONS

BROWN ELECTED TO HEAD AMERICAN INSTITUTE OF CHEMICAL ENGINEERS

A. I. CH. E. MAKES MANPOWER REPORT

CHEMICAL industries of the United States will have only approximately 50 percent of the number of newly graduated chemical engineers this year as compared with an average prewar year, according to a report submitted by S. D. Kirkpatrick, chairman of the Technical Manpower Committee and former president of the American Institute of Chemical Engineers. It is evident that a crisis is rapidly approaching in the long-time supply of these trained men.

Conclusions of the committee were based on a survey of 77 colleges and universities in the United States, which reported that there were only 1,500 senior students of chemical engineering who will graduate by June 1, 1944. This compares with about 3,000 seniors for last February. The report showed that in the case of juniors the drop was even more significant. The questionnaire showed that 1,300 will graduate by March, 1945, which compares with 3,763 last February. The committee also found that graduate study had suffered but that the engineering schools had been able to maintain staffs fairly well despite war demands.

AMERICAN PETROLEUM INSTITUTE ELECTS DIRECTORS

MEMBERS of the American Petroleum Institute's Board of Directors were elected by the membership at the general session of the Institute's 24th annual meeting in Chicago during November. The new directors, serving two years, succeed members of the board whose terms expired this year, or were elected to fill vacancies.

Reelected officers of the Institute for the year 1944 were as follows: W. R. Boyd, Jr., president; George A. Hill, Jr., vice president for production, Houston Oil Co. of Texas, Houston; vice president for refining, J. Howard Pew, Sun Oil Co., Philadelphia; vice president for marketing, E. V. Weber, Eureka Oil Co., Cincinnati; treasurer, O. D. Donnell, the Ohio Oil Co., Findlay, Ohio; and secretary and assistant treasurer, Lacey Walker, American Petroleum Institute, New York.

CHEMICAL ENGINEERS ELECT BROWN PRESIDENT

GEORGE Granger Brown, professor of chemical engineering and chairman of the department of chemical and metallurgical engineering of the University of Michigan, Ann Arbor, has been elected president of the American Institute of Chemical Engineers for the year 1944. It has recently been announced. Professor Brown succeeds Mr. J. L. Bennett, manager of chemical operations, explo-



G. G. Brown of the University of Michigan, newly-elected president of the American Institute of Chemical Engineers

sives department, Hercules Powder Co., Wilmington, Del. Dr. L. W. Bass, director of the New England Industrial Research Foundation, Boston, Mass., was elected vice-president of the national organization.

Professor Brown is well known in petroleum and chemical circles as a consultant and author and in 1939 he won the Walker Award, given by the A.I.Ch.E. for the most outstanding paper of chemical engineering interest published in the Transactions for the preceding three years. In 1940 he was given the Hanlon Award of the Natural Gasoline Association. Professor Brown has been with the University of Michigan since 1920, prior to which he was affiliated with the New York Edison Co., Aluminum Co. of America, and other firms. He is now consulting engineer for the Michigan Geological Sur-

vey, Natural Gasoline Association of America, and the American Petroleum Institute. He is the author of two books and numerous technical articles.

Dr. Lawrence W. Bass, newly elected vice-president, and director of the New England Industrial Research Foundation, was formerly an assistant director of Mellon Institute and director of research of the Borden Company. He studied at Yale University, Tulane, Pasteur Institute and New York University. He is a technical aide, office of the chairman, National Defense Research Council, chairman of the Committee on Quartermaster Problems of the National Research Council, and on the advisory board of the Quartermaster General.

A.I.M.E. ELECTS FULTON PRESIDENT

NEWLY-ELECTED president of the American Institute of Mining and Metallurgical Engineers is Chester Alan Fulton, president of the Southern Phosphate Corp., Baltimore, Md. Also elected were two vice presidents: John Livermore Christie, metallurgist and manager, Handy & Harmon, Bridgeport, Conn., and J. Robert Van Pelt, Jr., geologist and technical director, Museum of Science and Industry, Chicago. Directors of the Institute were elected at the same time.

E.C.P.D. ELECTS CHAIRMEN

EVERETT S. Lee, engineer, General Engineering Laboratory, General Electric Co., Schenectady, N. Y., was elected chairman of Engineers' Council for Professional Development at its eleventh annual meeting held recently in New York. Also elected to serve with him were James W. Parker, vice president and chief engineer, Detroit Edison Co., vice chairman; Stephen L. Tyler, executive secretary, American Institute of Chemical Engineers, secretary; and R. L. Sackett, dean emeritus of engineering, the Pennsylvania State College, assistant secretary. Committee chairmen representing the Council's four major fields of work were also named.

The Engineers' Council for Professional Development is a conference or-

CALENDAR

- | | |
|--------------------|------------------------------------------------------------------------------------------------------|
| FEB. 14-17 | Technical Association of the Pulp & Paper Industry, annual meeting, Commodore Hotel, New York, N. Y. |
| FEB. 20-24 | American Institute of Mining and Metallurgical Engineers, annual meeting, Waldorf-Astoria, New York. |
| APRIL 1-3 | American Society of Mechanical Engineers, spring meeting, Birmingham, Ala. |
| APRIL 12-15 | The Electrochemical Society, spring convention, Milwaukee, Wisc. |
| MAY 14-16 | American Institute of Chemical Engineers, semi-annual meeting, Hotel Cleveland, Cleveland, Ohio. |



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Postwar Plans



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ganized to enhance the professional status of engineers through the cooperative efforts of the national organizations of the leading engineering societies of this country and of Canada. Objectives of the Council are to coordinate and promote efforts to attain higher professional standards of education and practice, greater solidarity of the engineering profession, and greater effectiveness in dealing with technical, economic, and social problems.

EVEREST RECEIVES T.A.P.P.I. MEDAL

THE 1944 medal of the Technical Association of the Pulp and Paper Industry will be presented to David Clark Everest, president and general manager of the Marathon Paper Mills Co., Rothschild, Wis. The medal is given to an individual for making outstanding contributions to the technical advancement of the pulp and paper industry.

Mr. Everest has been connected with several paper companies and a number of other manufacturing companies. He was twice president of the American Paper and Pulp Association and was one of the organizers of the Institute of Paper Chemistry at Appleton, Wis., and has been a trustee and officer since its inception. Until the latter part of 1941, he was chief consultant to the pulp and paper branch of the Office of Production Management. He has served as a member of the Executive Committee of the Technical Association of the Pulp and Paper Industry.

The medal award will be made at the annual luncheon of the Technical Association of the Pulp and Paper Industry to be held at the Commodore Hotel, New York City, on Thursday, February 17, 1944. The presentation address will be made by Allen Abrams, who is now serving with the Office of Strategic Services in Washington.

A.S.T.M. FORMS COMMITTEE ON INDUSTRIAL AROMATICS

AT AN organization meeting of the new American Society for Testing Ma-

terials Committee on Industrial Aromatic Hydrocarbons held in New York recently, the personnel of the group was approved and temporary officers selected. This new standing committee of the A.S.T.M. was authorized after the Executive Committee had considered suggestions from a number of sources that such a group could contribute much in this field through the development of standard methods of tests, definitions and specifications for these materials and related products which boil below 400 deg. F. Products covered by the committee would include various grades of benzene, toluene, xylene, solvent naphthas and other light oil products.

Temporary chairman of the committee is J. M. Weiss, consulting chemical engineer, New York City, while the temporary secretary is R. P. Anderson, secretary, Division of Refining, American Petroleum Institute. C. A. Lunn, process engineer, Consolidated Edison Co., New York, is vice chairman. These officers will serve until June, 1944, when the committee will at that time meet to nominate and select permanent officers.

MANAGEMENT AND LABOR HOLD DISCUSSION ON POSTWAR

FOR THE first time, the top leaders of industrial management and labor sat down together for a comprehensive, round-table discussion of the postwar job problem. The occasion was the Second War Congress of American Industry at the Waldorf-Astoria Hotel, Dec. 8-10.

William Green, president of the American Federation of Labor, and Philip Murray, president of the Congress of Industrial Organizations, participated in this event with F. C. Crawford, president of the National Association of Manufacturers, and Paul Hoffman, chairman of the Committee on Economic Development. Eric Johnston, president of the U. S. Chamber of Commerce, completed the five-man discussion group. The special panel, "Jobs in Peacetime," was held December 8, opening day of the Congress.

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NEW HOT GLUING TECHNIQUE

A NOVEL method of gluing has been developed whereby heat is applied to a plastic in order to hasten the necessary chemical reaction and to cure or fix the plastic to a permanently hard, infusible waterproof state. At present a lengthy time is required in order to set glues before a laminated wood structure can be put in service. For example, a laminated aircraft propeller requires about eight days in the gluing procedure be-

fore it can be shaped. The new process reduces the time from eight days to about two minutes.

The process does not require any machinery or apparatus, and there is no plant conversion of any kind. No strategic materials are used and no trained personnel are necessary. The process can be put into practice immediately in any plant.

This development consists essentially of getting heat into the plastic glue by

Published by DINGS MAGNETIC SEPARATOR CO., 505 Smith St., Milwaukee, Wis.

New Alnico Test Magnet Offered by Dings



Horseshoe Alnico magnets for laboratories, smelters and refiners, etc., are now available through the Dings Magnetic Separator Company. These very powerful magnets measure 2½" high x 3" wide with pole bases ¾" x ¾". Prices available upon request.

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**Completely Illustrated
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Theory and Practice**

A new manual published by the Dings Magnetic Separator Company for plants operating magnetic separators is designed to aid them in securing better separator performance. Completely illustrated, it covers such subjects as: Magnetism; Electro-magnets; Mechanical and Electrical Maintenance; Repairs; Pulley Operating Speeds; Trouble Shooting; Installation Practice; Pulley Selection and Capacities; etc. Tells where, when and how to use magnetic pulleys, describes testing procedure, explains how to minimize chance of coils burning out, explains electro-magnetism. A valuable, useful guide to separator operation containing material never before written on the subject and data never before compiled under one cover.



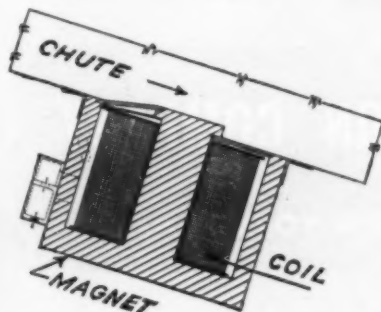
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DINGS Double-Gap Spout Magnets

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Dings Double Gap Spout Magnets are High Intensity Separators for removing iron from material passing down a chute, for protection of crushers, grinders or other machinery or for preventing sparks from tramp iron that might cause fires or explosions. Installed in the chute as shown in the diagram, they hold iron fast below a step in the magnet face. It is practically impossible to dislodge an accumulation of iron until the current is turned off. For automatically discharging the iron an automatic gate can be supplied as an integral part of the magnet. Catalog 301, available on request, describes Dings Double Gap Spout and Suspension Magnets.

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making the glue itself a conductor of electricity. This is accomplished by incorporating into the glue a special form of carbon black that does not interfere with the action of the glue, which quickly becomes sufficiently hot to seal and cure in a very short time. The process uses ordinary low-voltage current and simple types of presses, jigs or clamps for putting pressure on the wood layers. The moisture content of the wood is of little importance in this method.

It is expected that the new Gallay process will revolutionize the use of wood for structural purposes. The development has been followed with interest by government authorities in Canada, United States and Great Britain. The development is now past the experimental stage and has already produced excellent results in large-scale trials.

Dr. W. Gallay, Colloids and Plastic Laboratory, National Research Council of Canada, Ottawa, Canada, before the Society of Plastics Industry, New York N. Y., Nov. 9, 1943.

USE OF LIGNIN IN PLASTICS

MILD HYDROLYSIS breaks the cellulose-lignin bond of wood, freeing the lignin so that it can be used to rebond the cellulose fibers together. The hydrolysis procedure which has received the greatest attention at the Forest Products Laboratory uses dilute sulphuric acid in a rotary digester at a steam pressure of 135-200 lb. per sq. in. for 10-30 min. After drying, the hydrolyzed wood can be readily ground to a powder, preferably of 40-100 mesh.

It was found necessary to use auxiliary plastics or plastic-forming constituents, together with a plasticizer for lignin, when the added plastic material did not also serve as such. The most suitable material found in earlier work which served both functions is a mixture of 8 percent aniline and 8 percent furfural, together with 84 percent hydrolyzed wood and a small amount of mol lubricant such as zinc stearate. Molded products with good mold definition, water resistance, acid resistance, and electrical and mechanical properties can be obtained by pressing at 300 deg. F. for three minutes, at 3,000-4,000 lb. per sq. in.

Since the flow of this molding powder is not as great as that of the general purpose commercial molding powder and the product cannot be drawn hot from the press, further research on the plasticizing of hydrolyzed wood became desirable. The best flow properties so far obtained have been with a molding powder containing 25 percent of phenolic resin and 75 percent hydrolyzed wood. With this combination, the flow properties and the properties of the products are comparable with those of general purpose molding compounds, containing 50 percent phenolic resin and 50 percent wood flour. The fact that only half as much phenolic resin is required with the hydrolyzed wood indicates that the lignin or hydrolyzed wood imparts plastic properties to the product.

Hydrolyzed wood-phenolic resin molding

ing powders give molded products with flexural strengths ranging from 8,000-13,000 lb. per sq.in., water absorptions of only 0.2-0.3 percent after 48 hr. in water, and extremely high acid resistance. It appears to be possible to mold this material into thicker flawless sections than can be made of general-purpose commercial molding powders. If chips rather than sawdust are used as the raw material and the hydrolyzed product is abraded to a fiber rather than ground to a powder, it can be formed into a sheet on the paper machine. These sheets, with only small amounts of phenolic resin, can be compressed together into thick panels. The panels have considerable higher flexural strengths than panels made with molding powder because of the reinforcing action of the longer cellulose fiber.

Dr. Alfred J. Stamm, Forest Products Laboratories, Forest Service of the U. S. Department of Agriculture, before the Society of the Plastics Industries, New York, N. Y., Nov. 9, 1943.

HIGH EFFICIENCY MULTI-TUBULAR PACKED COLUMN

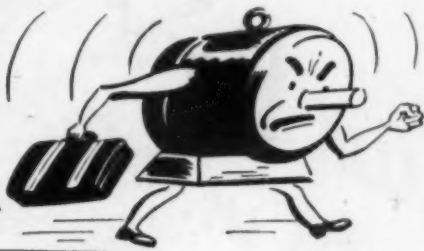
CONSTRUCTION, efficiency tests on and practical operation of a batch fractionating column containing seven 8-in. diameter tubes in parallel packed with 16 ft. of 1-in. Berl saddles have been carried out. The column consists of five identical sections, each containing about 9 ft. of packing. A single pot, single condenser, and a means for accurately proportioning reflux to each tube are employed. Reflux flows without mixing from one tube to that just beneath, while the rising vapors can remix between sections. Special operating instruments to aid in the control column were used.

Using benzene-ethylene dichloride test mixture under total reflux, at atmospheric pressure, the optimum operating conditions are a throughput of 255 gal. per hr. per sq.ft. of packing equivalent to a column throughput of 555 gal. per hr., 50 theoretical plates, and a pressure drop of 170 mm. Hg. At 200 mm. absolute pressure at the condenser inlet, the corresponding values are 155 gal. per hr. per sq.ft., equivalent to 340 gal. per hr., 45 theoretical plates, and 140 mm. Hg. By comparison with tests on single tubes, no loss of efficiency is enabled by the multi-tubular arrangement.

Under conditions where the efficiency is 47 plates with perfect reflux distribution, reducing the reflux to one tube by 40 percent of that normally flowing through it dropped the overall efficiency to 34 plates, while distributing all the reflux equally among six of the seven tubes reduced the efficiency to 12 plates. It is concluded that, for uniformly packed tubes, accurate proportioning of reflux is a necessary and sufficient condition for obtaining high efficiency from multi-tubular column of this type.

In practical operation, cuts of 20 deg. A.S.T.M. boiling range from 5-90 percent are obtained at 10-15:1 reflux ratio from aromatic hydrocarbon mixtures from 120-210 deg. C. Cuts of 1 deg. C. boiling range from the 5-90 per-

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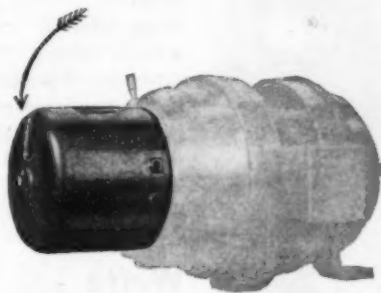


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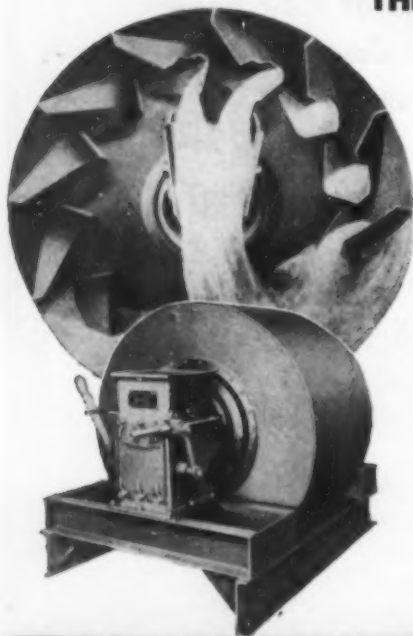
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cent point are obtained at 50-20:1 ratio from C_2 cuts rich in isoprene and perylene.

E. H. Smoker, United Gas Improvement Co., Philadelphia, Pa., before the American Institute of Chemical Engineers, Pittsburgh, Pa., Nov. 16, 1943.

NITRATION OF TOLUENE TO MONONITROTOLUENE

RATE OF nitration of toluene to mononitrotoluene with mixed acid was determined in a continuous apparatus at a temperature of 95 deg. F. The acid phase concentrations ranged from 0.2 mole-percent nitric acid, and from 0.2 mole-percent sulphuric acid. The agitation was sufficient to eliminate transfer resistances as a factor in nitration rates. A limited amount of data, at 113 deg. F. and 113 deg. F., indicate that a 18-deg. F. increase in temperature doubles the rate of nitration.

Rate of nitration, expressed as mole of mononitrotoluene produced per hour per liter of acid phase was correlated by plotting the logarithm of the rate divided by the mole fraction of toluene in the organic phase, as a function of the logarithm of the mole-percent of nitric acid in the acid phase, with the mole-percent of sulphuric acid in the acid phase as a parameter. This correlation has been expressed in terms of an equation in two auxiliary curves, a form which is convenient for interpolation.

Data obtained in this investigation may be applied directly to those commercial operations in which highly dispersed emulsions are formed.

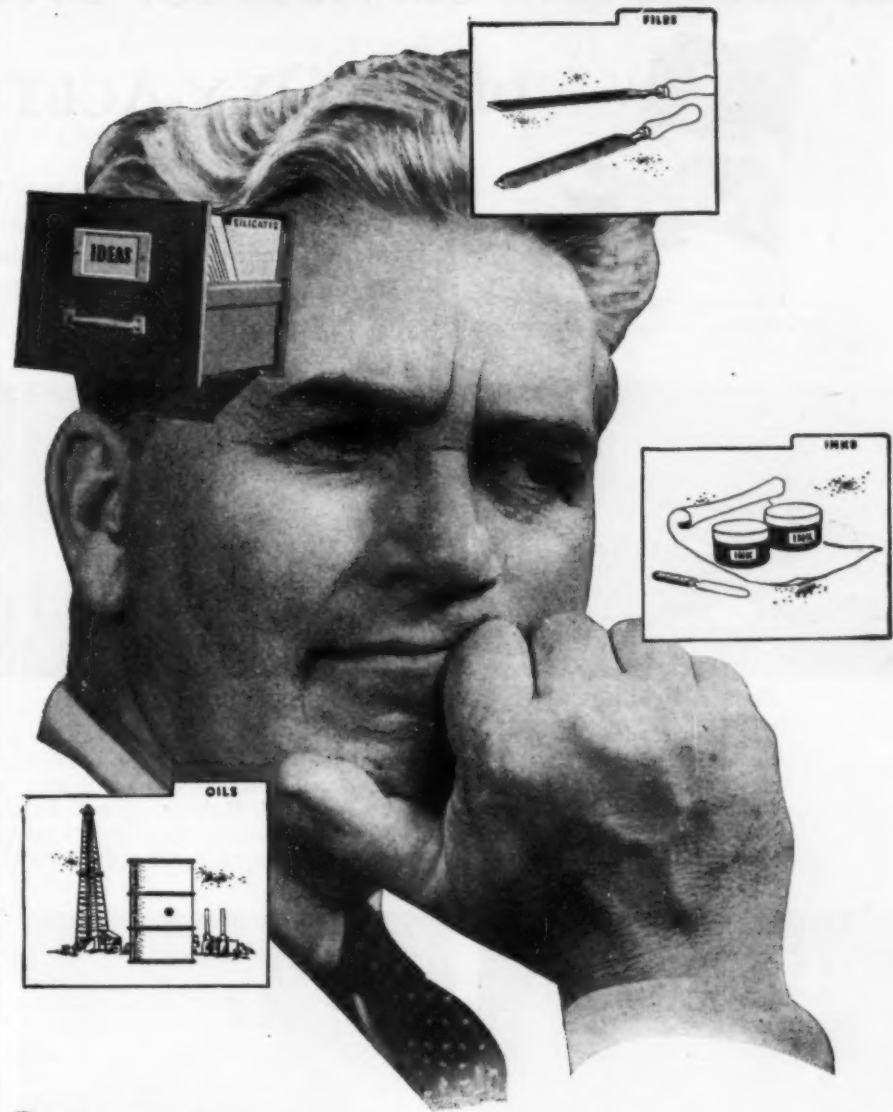
Clyde McKinley and Robert R. White before the American Institute of Chemical Engineers, Pittsburgh, Pa., Nov. 16, 1943.

IRON PLATING

DEPOSITION of ductile iron from chloride solution was reported by Kaper in 1937, who arrived at the conclusion that relatively soft, ductile iron can be deposited from a bath containing 5 N ferrous chloride and 0.10 N hydrochloric acid at a temperature of 222 deg. F., and a current density of 186 amp. per sq. ft.

However, an improved chloride iron plating solution has been developed, in which grain size is controlled by the addition to the solution of relatively small amounts of manganese chloride and pitting is eliminated by the use of the proper wetting agents. The improved iron plating solution contains 200-500 gm. per liter of $FeCl_2 \cdot 4H_2O$, 3-5 gm. per liter of $MnCl_2 \cdot 4H_2O$, and about 1 gm. per liter of gardinol W. A powder. The temperature range over which this solution will produce heavy fine-grain ductile deposits is broad, running from 150-220 deg. F. The pH range is 1.5-2.5, with an optimum at about 2.0 as determined with a glass electrode. The cathode current density range broadens as the temperature increases. At 160 deg. F., the maximum current density is of the order of 50 amp. per sq. ft. In uncontaminated solutions the current efficiency is above 95 percent.

IDEA STARTERS—PQ SILICATES



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Meantime, some of the current trends and developments in silicate of soda as recorded in recent patents may suggest a practical solution to one of your present problems. Write to us about any possible use of silicate that may occur to you.

Reconditioning metal workers' files: Files are degreased in boiling alkaline solution, washed by spray of water, etched in successive baths of hydrochloric, nitric and hydrochloric acids; finally rust-proofed by immersing in a dilute solution of silicate of soda.

Quick-set inks: Patentee finds that if inked sheet from printing press is exposed to a mist of silicate of soda, quicker drying results. For color work, it is unnecessary to use inks with expensive volatile solvents and driers.

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 Chicago Sales Office: 205 West Wacker Drive

No ventilation is necessary. Many materials, however, will cause embrittlement and gassing in this solution.

Wm. B. Stoddard, Jr., research department, Champion Paper & Fibre Co., Hamilton, Ohio, before the Eighty-Fourth General Meeting of the Electrochemical Society, New York, N. Y., Oct. 13-16, 1943.

PROCESS FOR AMINOGUANIDINE AND DERIVATIVE DYES

In making dyes from aminoguanidine it was first necessary to work out a process for its preparation. This involved the electrolytic reduction of nitroguanidine. The nitroguanidine resulted from the dehydration with sulphuric acid of guanidine nitrate, which in turn was derived from dicyanamide with ammonium nitrate.

Aminoguanidine was diazotized and coupled with various intermediates, furnishing azo dyes of good dyeing properties on animal fibres such as silk and wool, particularly in conjunction with a mordant. Such dyes are of various shades, with the browns and oranges predominating.

Diazotization of the aminoguanidine was carried out in a neutral aqueous solution forming the very slightly soluble diazonium hydroxide derivative. This latter was coupled with the dye intermediate in hot aqueous solution under controlled conditions of pH to give the various dyes. These latter are soluble in alkaline solutions, but are precipitated by acids.

R. Norris Shreve, Purdue University, and R. P. Carter, Hercules Powder Co., Wilmington, Del., before the American Chemical Society, Pittsburgh, Pa., September 6-10, 1943.

FAITY AND ROSIN ACIDS FROM TALL OIL

Tall oil was hydrogenated and its two main components, stearic and abietic acids, were separated by selective adsorption of the first on activated carbon. An 8 percent solution of the hydrogenated tall oil in a selected solvent was added to a column containing the activated carbon. The hydrogenated tall oil was fixed on the adsorbent, and abietic acid was then washed through the column by fresh solvent. Additional solvent removed the stearic acid which is adsorbed more tenaciously.

Sharpness of separation and the allowable rate of through-put was found to depend largely on the solvent used. Nitropropane-1 was the best solvent among the 29 considered. In one pass through the column, using nitropropane-1, 80 percent of the abietic acid and 90 percent of the stearic acid were removed, each in a substantially pure state.

Adsorption isotherms for the individual components on activated carbon and for mixtures containing 50 percent of each, were determined in selecting the current solvent.

George Papps and Donald F. Othmer, Polytechnic Institute of Brooklyn, Brooklyn, N. Y., before the American Chemical Society, Pittsburgh, Pa., September 6-10, 1943.

Products and Services for every Application of the OXY-ACETYLENE Process



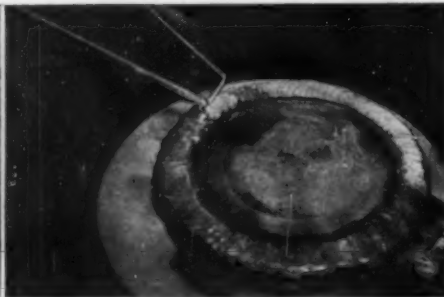
MARITIME "M" AWARD FOR
OUTSTANDING PRODUCTION ACHIEVEMENT

Oxy-acetylene processes are used throughout industry to speed up production, to conserve materials, to lower operating costs, and to simplify problems of maintenance and repair. Some of the many oxy-acetylene applications are outlined here.



Bronze-Welding

The oxy-acetylene flame makes possible the joining of practically any metals—like or unlike—so that the weld is as strong as the base metal itself. *Bronze-welding* speeds the repair of cracked or broken steel and iron parts right on the job. *Resurfacing* of worn parts with steel, iron, bronze, or other types of welding rod avoids delays and conserves materials. *Hard-facing* with Stellite alloys makes parts that are subject to abrasion, heat, or corrosion last from two to twenty-five times longer. Welded piping systems use less fittings, occupy less space, and remain leakproof and maintenance-free indefinitely.



Resurfacing



Hard-Facing



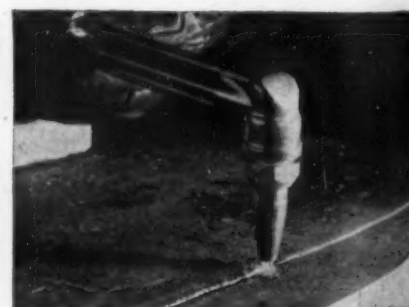
Machine Shape-Cutting

Shape-cutting quickly produces simple or intricate steel shapes with clean-cut edges that usually require no machining. This method is also used for bar and billet cut-off, for straight-line cutting, and for preparation of plate edges prior to welding.



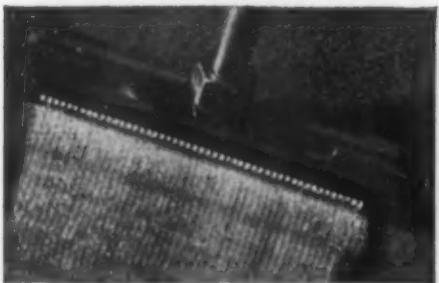
Stack-Cutting

Stack-cutting of tightly clamped piles of plate is an adaptation of shape-cutting to permit fast production of quantities of identical parts. This oxy-acetylene method usually is faster and more economical than shearing or other mechanical methods.



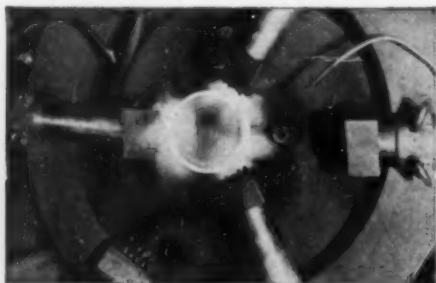
Hand-Cutting

Hand-cutting speeds the cutting of structural steel to length, quickly severs gates and risers to reduce machining, and facilitates alteration work. With Oxweld gouging nozzles, a groove of surface metal can be removed without harm to adjacent areas.



Flame-Priming

This process removes loose scale, rust, and surface moisture from steel prior to painting—making paint go on faster, bond tighter, and last longer.



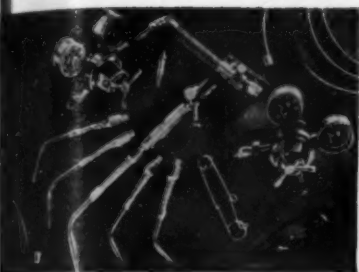
Flame-Hardening

This oxy-acetylene process is used to impart a hard, wear-resistant case to steel and iron parts without affecting the toughness of the core.



Heating

Heating for bending, straightening, and forming operations is facilitated by the oxy-acetylene flame. Shown here, a pipe is being wrinkle-bent.



Hand Apparatus

Oxy-acetylene apparatus which may be ordered from Linde includes oxy-acetylene blowpipes for all welding and heating work; oxy-acetylene cutting blowpipes, cutting attachments, and nozzles;

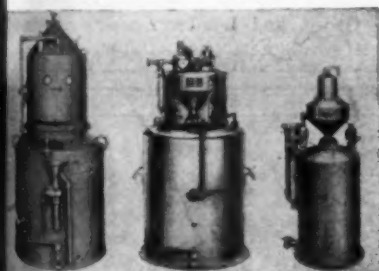
and oxy-acetylene descaling and flame-priming equipment. Oxweld apparatus is supplied from Linde offices and warehouses. The Purox and Prest-O-Weld lines are distributed by industrial and automotive jobbers. Prest-O-Lite air-acetylene appliances for soldering and brazing are also distributed by these jobbers.



Welding Rods, Fluxes, and Supplies

Oxweld welding rods and fluxes are of exceptionally high quality. The many kinds and sizes of Oxweld rods make it possible to select the one that will give best results on each job.

The Oxweld line also includes gloves, goggles, lighters, hose, ferrules, and asbestos paper. Rods, fluxes, and supplies may be ordered from Linde or from automotive and industrial jobbers.



Generators and Manifolds

Oxweld acetylene generators produce low-cost acetylene and are made for both portable and stationary use—with maximum generating capacities of

from 30 to 9,000 cu. ft. per hour. Oxweld oxygen and acetylene manifolds are used for centralizing the oxygen and acetylene supply from cylinders.

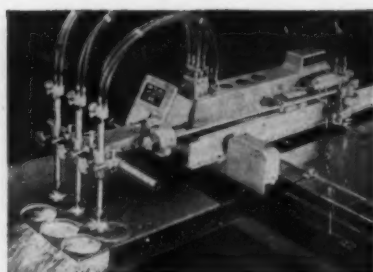


Send for This Catalog—

For a more detailed description of Linde processes, and for more information about availability of Linde products, process literature, and process service, send for the descriptive, 8-page catalog shown here.

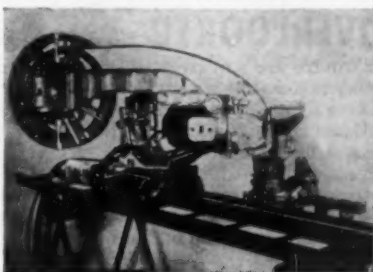
Machine Apparatus

Included in the complete line of Oxweld apparatus are portable and stationary oxy-acetylene shape-cutting machines; straight-line cutting machines; flame-hardening apparatus; bar and billet cut-off machines; equipment for automatic welding; and tractor units for plate-edge preparation.



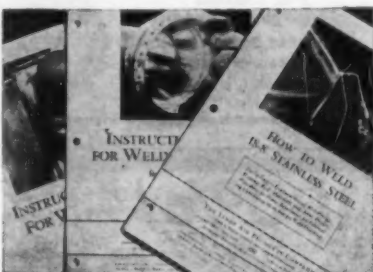
Unionmelt Welding

This unique electric process makes high-quality welds in any thickness of steel—in one pass—and without flash, glare, or sparks—at speeds as much as twenty times greater than similarly applicable methods. The process is fully automatic. Speed and current values are established by electric controls adjusted by an operator.



Process Literature

Linde makes available to customers an extensive library of process literature which contributes to the knowledge of operators and shows how to use the oxy-acetylene process profitably.



Oxygen, Acetylene, Carbide


Linde oxygen, Prest-O-Lite acetylene, and Union Carbide are distributed through numerous Linde plants and warehouses located to assure dependable deliveries and low transportation costs. This reflects Linde's efforts to help assure availability of these materials.



The words "Stellite," "Linde," "Prest-O-Lite," "Union," "Oxweld," "Purox," "Prest-O-Weld," and "Unionmelt" are trade-marks.

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This territory has been thoroughly surveyed by Missouri Pacific industrial engineers who will be glad to supply accurate data on available plant sites and areas most promising for expanding business and industry. Your inquiry will receive prompt attention; write or wire

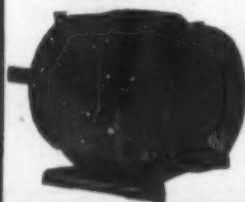
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ST. LOUIS
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BALDOR
BETTER MOTORS

NEWS FROM ABROAD

POSTWAR CHANGES IN BRITISH CHEMICAL INDUSTRY STUDIED FROM DOMESTIC AND EXPORT VIEWPOINT

Special Correspondence

SEVERAL prominent leaders of the British chemical industry have lately expressed their views on postwar changes and dangers for the British trader and manufacturer. Postwar reconstruction is in any case a favorite topic at annual conferences and other meetings, partly because so much of the actual war work is secret and cannot therefore be discussed and partly because the prospect of a better future with plenty of opportunities helps many businessmen in England to shoulder with greater ease the duties war imposes on them. These forecasts are often vague, sometimes lacking in realism, or even drawn up in a vacuum without regard to external factors. And yet they are all characterized by certain definite tendencies which ought not to be overlooked. There is, first of all, the realization that the British chemical industry cannot simply return to prewar methods. There is, further, sober confidence in its ability to compete successfully in export

markets and to stand its own in the field of development; this confidence is based on the experience of four years of wartime orientation and adaptation. There is, thirdly, the wish to bring the chemical industry into closer contact with other staple industries to help to solve their basic problems. There is, fourthly, a desire to continue after the war the cooperation with Allied nations in the scientific and industrial fields which have been advanced so greatly and with so visible results in wartime.

Lord McGowan, who as chairman of Great Britain's biggest industrial combine, Imperial Chemical Industries Ltd., bears a special responsibility but can also be sure of being listened to with special attention, discussed "The Future of the Chemical Industry" in an address to a joint meeting of the Institution of Chemical Engineers and the Chemical Engineering Group and London Section of the Society of Chemical Industry held

This is under no circumstances to be construed as an offering of this Preferred Stock for sale, or as an offer to buy, or as a solicitation of an offer to buy, any of such Stock. The offer is made only by means of the Prospectus.

NEW ISSUE

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(Without Par Value—\$4 Dividend)

Holders of the Company's Common Stock were given pro rata rights to subscribe to an aggregate of 249,741 shares of Cumulative Preferred Stock, Series A, under terms outlined in the Prospectus. Such rights expired at 3 P. M. Eastern War Time, November 22, 1943. This announcement relates only to such shares as have not been subscribed for through the exercise of the rights.

Price \$105 per share

Copies of the Prospectus may be obtained from such of the several underwriters, including the undersigned, as may legally offer this Stock in compliance with the securities laws of the respective States.

SMITH, BARNEY & CO.

November 24, 1943

about the middle of October. Speaking to an audience mainly interested in the scientific and technical side of the industry, he stressed the need for research and development. He said it would be to the good of all if from time to time university workers were hauled gently to the ground to observe the functioning of life at the lower levels; and for industrial workers to be hoisted equally gently so that they may be given a clearer view of the stars of the scientific firmament. Industry's responsibility in research was to investigate problems with which industry was concerned. The research needs of chemical manufacturers were too many and varied to be covered by any one chemical research association. What was needed was a far greater measure of research cooperation between firms. There was also the problem of the small firm whose resources were likely to be insufficient to permit it to undertake adequate research. Though such firms could not look for help to a research association, there was room for some organization to help them, and Lord McGowan referred to the Mellon Institute in the United States as a model.

CONVERTING RESEARCH RESULTS

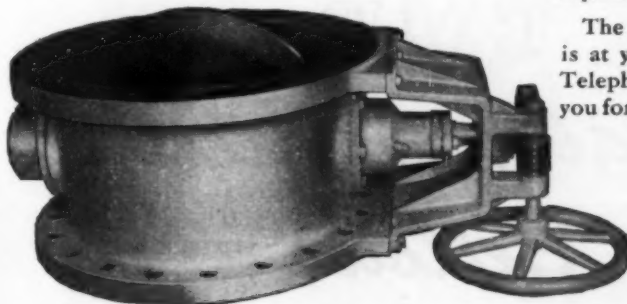
Another aspect of the chemical industry which needed careful attention was what was known as development, or the conversion of research results into commercial processes. The development stage of a product might cover a number of years before the merits of it could be accurately assessed and the most advantageous form in which it could be used determined. Although distinct in their functions, research and development were so closely interlocked that it was frequently impossible to decide where one ended and the other began. For a number of years it had been increasingly realized in the chemical industry that technical service to customers is indispensable to sales organization, such service benefiting both producer and consumer in two ways. First, customers were helped to make the best use of the products they bought; secondly, technical service personnel became increasingly familiar with the problems and needs of consumer firms. Knowledge of these matters provided the stimulus to further research. The importance of technical service applied equally to export and home trade.

Dealing with a controversial subject, that of patent protection, Lord McGowan expressed himself strongly against the suggestion that the system of exclusive licenses should be abolished and superseded by one of non-exclusive licenses obtainable as a right by all wishing to secure them. The grant of non-exclusive licenses only would lead to unrestricted competition and to manufacture in small units and at high cost. It would lead to a great increase in the operation of inventions as secret processes, with the most unfortunate effect. In any event these matters were taken care of by the existing Patents Act itself. On the

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In strategically located cities from Boston to Dallas, and from New York to San Francisco, there are thoroughly experienced R-S Valve engineers who are eager to assist in the simplification of valve installations, willing to recommend the type of equipment best adapted to a particular control or shut-off condition and cooperative in pointing out possible changes in present equipment that will effect greater efficiency and economy.

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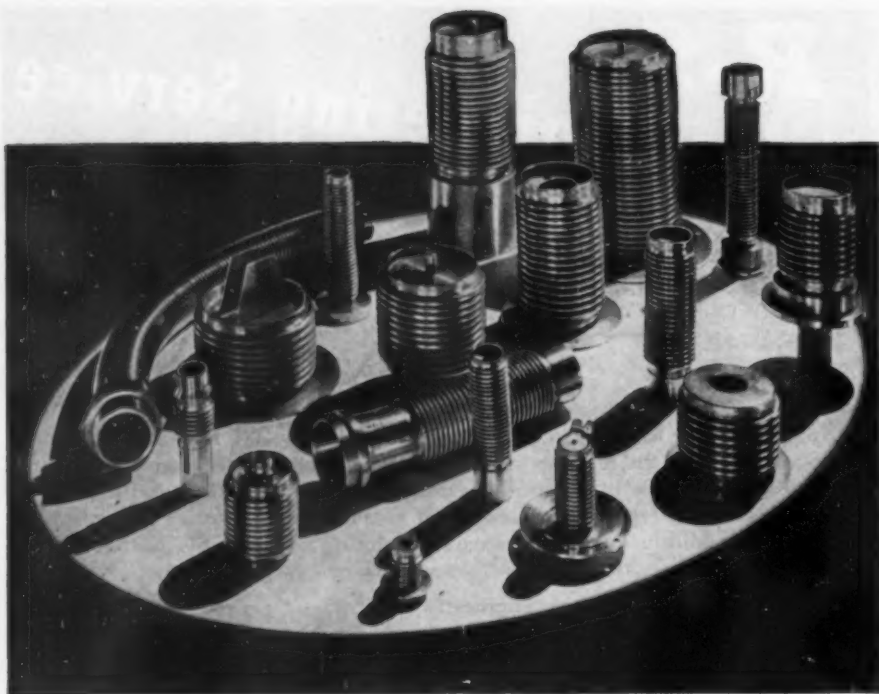
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R-S Streamlined BUTTERFLY VALVES

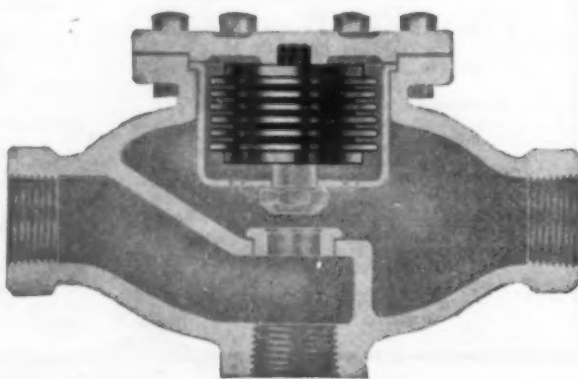


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Wherever stainless steel's corrosion resistant qualities and temperature values are required in bellows service, CMH uni-metal circular seam welded assemblies are filling that need.

No Solder or Flux Required

Long lengths of CMH Bellows are standard production; strength is further enhanced with multiple ply assemblies when needed.



Ask for engineering recommendations on specific applications.

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other hand, Lord McGowan thought that, while good progress had been made in the conditions of employment of technical staff, there was still much that could be done. Complete freedom of publication by industrial staffs would be impracticable, but a more liberal attitude might be adopted.

Lord McGowan, as other speakers before him, attached particular importance to the most economical use of the raw material coal, which he used as an outstanding example to illustrate the national interest in research and development. The future of coal was anything but bright, and two unpalatable facts should be remembered, he said. First, during the past six years the cost of winning coal in Great Britain had risen by no less than 70 per cent. Secondly, pit prices of coal in the U.S.A. were lower than corresponding British prices by about 10 sh. a ton, or by an amount little less than half our prewar price. A further cause for uneasiness was the decline in coal output, from an average of 224 million long tons in 1933-38 to about 190 million tons. These factors alone underlined the importance of insuring that coal should be won at the least possible cost and used to the very best advantage—a double goal only obtainable through research. The responsibility for organizing and coordinating a research program of this magnitude rested with the government.

It so happens that only a few weeks prior another £500,000 was set aside for coal research including investigations into the possibility of its chemical utilization. There is no doubt that many responsible leaders both of the coal mining and of the chemical industry or at least those sections of it which rely on coal as a fuel and as a raw material have given much thought to the possibility of combining their energy to find a solution for the British coal problem which has proved such a difficult task for the last twenty years. So far it seems that the problem has not yet been tackled on a sufficiently ambitious scale. Attempts with hydrogenation, low-temperature carbonization, new processes of gasification have been undertaken, but the results seem to have been somewhat disappointing, possibly because there was not enough coordination between producers and consumers of certain by-products on the profitable disposal of which these processes depend. It would appear that many industrial developments, impossible and unremunerative when undertaken alone, would become profitable were they to be coupled with similar developments in adjoining fields.

EXPORT PROSPECTS

Then there is the export problem which Lord McGowan did not discuss extensively, but which is very much in the minds of British chemical manufacturers today. Wartime conditions have raised manufacturing costs in Great Britain, and an artificial lowering of relative costs by means of currency manipulations would be regarded

as a failure by the public. It is possible, and indeed likely, that certain cost elements will decline once the war is over. Others have come to stay at their higher levels. On the other hand, certain export markets have been lost to local industries set up in view of the failure of the traditional suppliers abroad to meet requirements. Thus the process of specialization will have to go much further if chemical manufacturers in old industrial countries wish to retain their export markets. There must be greater reliance on local raw materials and such byproducts from them as cannot be disposed of in the home market. But here again doubts are expressed as to the willingness of former customers to absorb British surplus products. Will, for instance, the United States, continue to take creosote and other neglected coal-tar products? If not, how and where and in which form are they to be disposed of? These are questions which are being asked more frequently in England and with, so far, no satisfactory answer. There are many well informed and well intentioned observers in England who believe that coordination on a national scale is not enough and that international cooperation on hitherto unconceived lines will be needed to overcome the most urgent postwar problems. And yet, the smaller chemical firms in England do not wish to abandon their identity or to agree to restrictions on the scope of their activities and enterprise. A system which insures cooperation while leaving ample room for private initiative is what is wanted, but it will not be easy to find.

ARGENTINA CONSUMES MORE CALCIUM CARBIDE

CONSUMPTION of calcium carbide in Argentina has increased because of the greater use of acetylene welding by industry, the foreign press reports.

Before the war, most of Argentina's requirements of this material were imported from European sources—in 1940, 7,924 tons out of a total of 10,732 came from Europe. In 1942, however, only 622 tons were received from Europe.

Total imports of calcium carbide in 1942 amounted to 12,203 short tons, of which the United States furnished 8,373. Corresponding figures for 1941 were 8,245 and 5,723, respectively.

VARYING ESTIMATES ON FLAX CROP IN CANADA

OFFICIAL and private estimates of this year's flax harvest in the Prairie Provinces of Canada range from 16,711,000 to 20,258,000 bushels.

The preliminary official estimate of the flaxseed yield per acre in 1943 was 6.3 bushels, compared with an average of 7.2 bushels during the 1938-42 period.

Of 570 cars of flaxseed inspected in western Canada during the first 2 months of the crop year, 99 percent was No. 1 Canadian Western.

SEALS...



Simplifies pipe line maintenance

This one Babbitt Sealant will handle 90% of industry's common sealing jobs—as a lubricant-sealer for threaded pipe joints (particularly those subject to vibration, heat or solvent action), as a casing joint seal, a gasket dressing, and in many other applications.

Like all Babbitt Plastic Sealants, Sofset No. 74 assures leak-proof, permanently workable unions that can be taken down easily at any time without damage—an important factor in simplifying pipe line maintenance, saving time, labor, material and money.

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A COLD-APPLIED THERMOPLASTIC COATING

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A NAME
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Don't wait until you are face-to-face with critical problems concerning corrosion and contamination. Get the facts about *Amercoat* now!

Amercoat protects metal, concrete and wood surfaces from corrosion by many different acids, alkalies and chemical compounds now required in the manufacture of vital war and food supplies.

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Thus, *Amercoat* does an important two-way job these days . . . equipment must be protected because replacements are hard to get . . . precious materials must not be wasted.

EASY TO APPLY BY CONVENTIONAL METHODS

Amercoat compounds are inert thermoplastic coatings. When sprayed or brushed on metal, wood or concrete, they provide an impervious, odorless and tasteless surface. Ordinary industrial spray painting equipment can be used for application.

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Amercoat is impervious to the corrosive action of such varied materials as: Aviation Gasoline . . . Sea Water . . . Ammonium Nitrate Alcohol . . . 40% Formaldehyde . . . Lactic Acid . . . 50% and 75% Caustic Soda . . . Concentrated Magnesium Chlorid Brine . . . Drinking Water.

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GERMANY MAKES PUMPS FROM PLASTIC MATERIAL

BECAUSE of the need for economy in the use of metal, experiments have been conducted in Germany with plastics as a construction material for pumps, a foreign technical publication reports.

Results have not been completely unsatisfactory, it is stated. Chemical resistance was found generally good. The principal difficulty was the swelling of the phenolics, caused by moisture absorption of the fillers. Asbestos was found the best material to use with plastics. Crushed and milled stone has also been comparatively satisfactory, but textiles and cellulose products proved unsuitable.

Thermoplastics without fillers gave better results so far as swelling was concerned, but they were difficult to press. Tubular and flat pieces for their valves are usually welded or glued.

Efforts have been made to improve the resistance of plastics to high temperatures. The use of several coats of resins applied by painting or annealing to protect metal pumps has been tried, but little experience has been gained so far; synthetic rubber has also been used for this purpose because it resists the action of a number of chemical materials and has a maximum temperature of about 100 deg. C.

Vinidur foils (hard polyvinyl chloride) have been employed in machinery construction generally, on all metals except lead and some light metal alloys; they have also been used in combination with concrete and wood.

PRODUCTION OF ALCOHOL IN MEXICO INCREASES

WHILE Mexico is not prominent as a producer of alcohol, it has been making headway with steadily rising outputs from 1940 to date. The greater part of Mexican alcohol is made from molasses but cane juice also is used as a raw material and there is some production from piloncillo. In 1940 the amount of alcohol produced in Mexico was reported at 23,320,052 liters. Of this 20,700,049 liters was made from molasses and the remainder from cane juice. Outputs increased each year in the interim and it has been estimated that 1943 production will approximate 46,000,000 liters of which 38,000,000 liters may be from molasses and 8,000,000 liters from cane juice.

INDIA NOW MAKING CHEMICALS FORMERLY IMPORTED

CAUSTIC soda was formerly imported by the Indian textile industry almost entirely from the United Kingdom, though limited amounts were received from the United States and Japan, says the British press. Imports in 1939-40 were valued at 7,230,601 rupees.

Prewar imports of sodium hydrosulfite, also were used by textile mills, were divided between the United Kingdom and Germany. The value of these imports in 1939-40 amounted to 1,805,542 rupees.

DIGESTS FROM FOREIGN LITERATURE

SOVIET DEVELOPMENTS IN CATALYSIS

SINCE synthetic organic chemistry owes most of its success to catalytic processes, Soviet Russia has established special institutes, such as the State Institute of High Pressures in Leningrad, for the exclusive study of catalysis. One of the outstanding examples of catalysis is hydrogenation in the presence of metals of the platinum and nickel groups. A. C. Fokine discovered hydrogenation in the presence of finely divided metals of the platinum group, and a great deal of work was done on the hydrogenation of glycols, alcohols and hydrocarbons of the acetylene series by U. C. Zalkind and his co-workers.

A. C. Ginsberg, A. P. Ivanov and Urashevsky used such metal catalysts on carriers. M. C. Platonov did a great deal of research work on the use of rhenium preparations for catalytic hydrogenation and dehydrogenation. N. D. Zelinski developed the catalytic dehydrogenation of hexamethylene derivatives with platinum catalysts.

A. A. Balandin developed the theory that catalytic action is due to a change in the form of the molecule under the influence of the catalyst. Only compounds with six-membered rings are readily dehydrogenated; a five-membered ring is more readily decomposed than dehydrogenated.

R. J. Levine, who studied the mechanics of irreversible catalytic conversion

of such hydrocarbons as the cyclohexanes, has found that the conversion consists of two processes: (1) isomerization of the original hydrocarbon with conversion of the double bond from the side chain into a ring (and a triple bond into two double bonds of the ring), and (2) the irreversible normal catalysis forming the cyclo-olefin hydro-carbons.

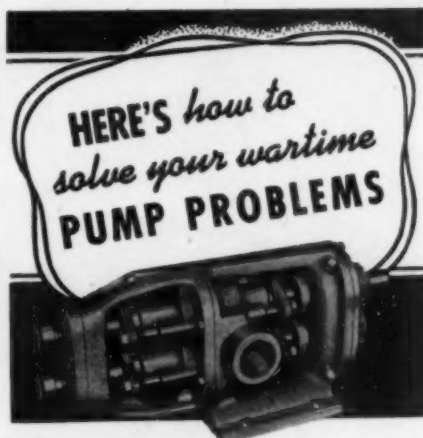
Digest from "Developments in Organic Chemistry in the USSR since the October Revolution" by C. N. Danilov, *Zhurnal Obshchei Khimii* XII, No. 11-12, 533-567, 1942. (Published in Russia.)

CASEIN FIBER TREATMENT WITH CHROME SALTS

ONE of the most complicated operations in the production of casein fibers as a substitute for wool is the tanning of this synthetic fiber to give it the necessary physical and chemical properties. Until recently, formalin and aluminum salts were used for tanning casein fiber.

Fiber treated with formaldehyde, however, is not stable in warm water and although better results are obtained by treatment with formaldehyde and alum, the fiber still cannot be heated in the presence of acids. Since casein is frequently used in combination with natural wool, it must be able to withstand the same conditions as wool during dyeing and other processing.

Experiments on tanning with chromium salts proved that the latter im-



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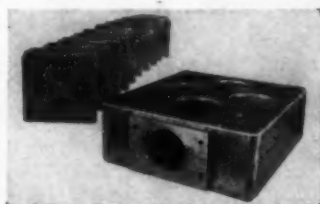
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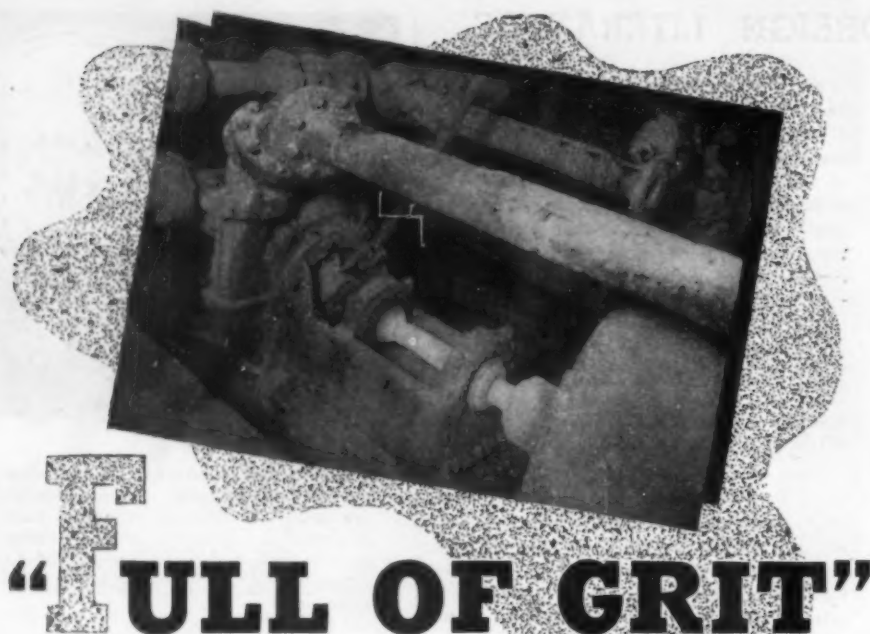


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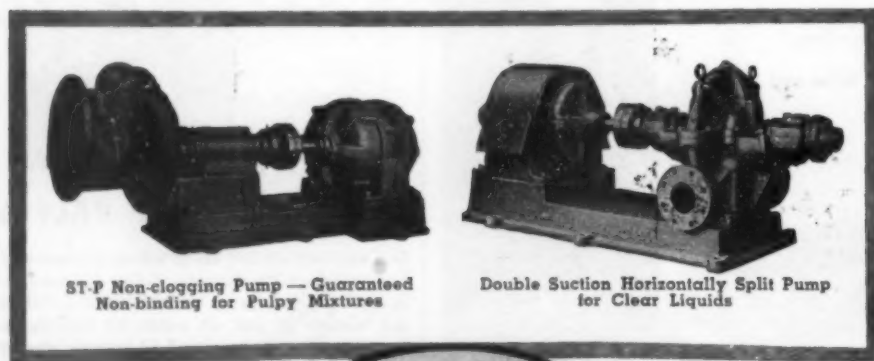
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CENTRIFUGAL PUMPS

part the desired properties to the casein fiber. A satisfactory procedure developed for tanning the casein fiber is as follows: the fiber is immersed in a solution of formalin containing sodium chloride or sodium sulphate and left there for 8 to 10 hr. at a pH of 4-5. The fiber is then removed and, after 25-30 min. of draining, is washed for 10-15 min. with cold water. The washed fiber is centrifuged and placed in a solution of basic chromium salt in which it is tanned for one hour at a temperature of 45 deg. C.

The basicity of the salts was maintained at 45 percent (according to Schorlemmer) throughout the tanning process. The absorption of Cr_2O_3 was found to be proportional to the concentration of the chrome liquor, and a Cr_2O_3 concentration of 9 g. per l. was satisfactory for obtaining a hydrothermically stable fiber. The greater part of the Cr_2O_3 is absorbed in the first two hours of tanning. The liquor can be re-used from 20 to 25 times without affecting the quality of the fiber.

The resulting fiber is thermostable, loses very little strength on boiling, can withstand the carbonization process successfully, and it can be dyed successfully with acid dyes. Its strength is 70 percent that of natural wool.

Digest from "Production of Casein Fiber with a High Hydrothermic Stability" by G. A. Arbuzov and A. M. Katz, *Zhurnal Prikladnoi Khimii* XV, No. 5, 364-361, 1942. (Published in Russia.)

SILICO-ORGANIC COMPOUNDS

UNTIL recently no attempts have been made to utilize the high stability to heat of silico-organic compounds for production of heat-stable electrical insulation materials. The temperature of decomposition of some of these compounds goes up to 400-550 deg. C. Nor have the electrical properties of these materials been fully described or studied. Certain of the silico-organic compounds have still another advantage over the corresponding organic compounds in that they are not very combustible and decompose gradually only on the application of intense heat and without bursting into flames.

One class of oxygen-containing organic compounds of silicon (siloxanes and siloxines) is of particular interest although they have not been investigated much as yet due to the extreme complexity of their nature. All the anhydrides of silanediols and silanetriols are typical siloxane groups.

General method for the synthesis of silanols consists in the preparation of the corresponding aryl (alkyl)-monosilanechlorides by the Grignard reaction, followed by decomposition of such chlorides with water. Either silanols, silanediols or silanetriols can be produced, depending on the proportions of Grignard reagent and SiCl_4 . On heating, the siloxanes lose water and eventually form complicated polymerized anhydrides.

Synthesis of siloxanes, in spite of the simplicity of the reaction, is not so easy and it is necessary to observe a number of conditions in carrying out the process. Depending on the method by which the

chloride is decomposed, one and the same product can yield a gelatin, an adhesive, an amorphous and non-fusible substance or a crystalline substance with a definite melting point.

Silaneetriols are arranged as follows according to their electrical properties and stability to heat:

$C_6H_5Si(OH)_3 > C_6H_5CH_2Si(OH)_3 > C_{10}H_7Si(OH)_3$, where the dielectric losses increase with the increase of the hydrocarbon group of the siloxanes, and the stability to heat decreases. Thus the polymer of phenyl silaneetriol has a much higher stability to heat and lower dielectric loss than alpha-naphthyl silaneetriol.

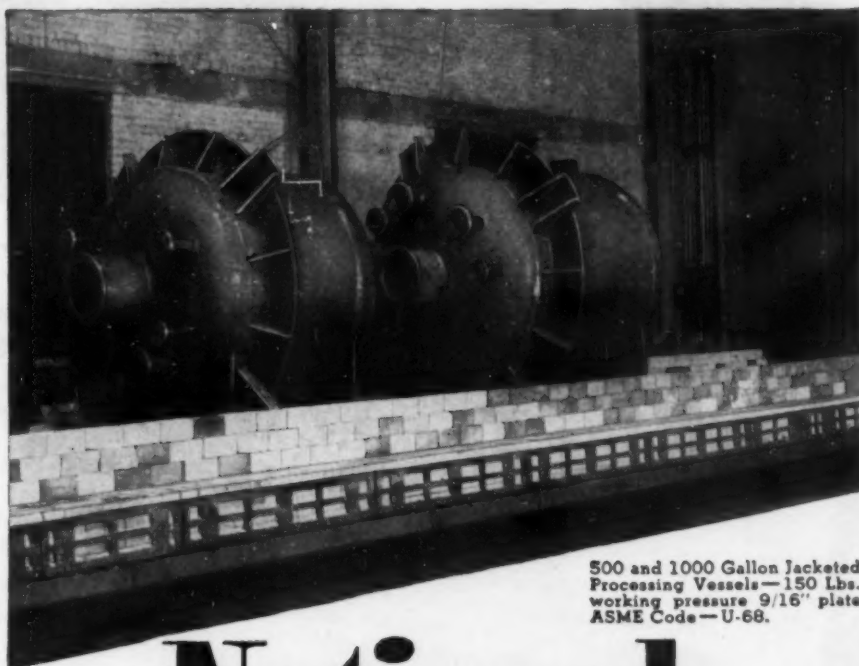
Since the brittleness of the siloxanes studied hinders their practical application as non-conducting, heat-stable surface coatings, experiments were carried out on decreasing the brittleness of silico-organic glasses by introduction of fillers (such as insulation oil lacquers). In this way, the mechanical stability of silico-organic surface coatings can be increased with slight decrease in their stability to heat.

Digest from "Certain Properties of Silico-organic Compounds," by M. M. Koton, *Zhurnal Prikladnoi Khimii* XII, No. 10, 1435/1439, 1939. (Published in Russia.)

SULPHITE WASTE LIQUOR

IN THE sulphite pulping of wood, a part of the dissolved sugars is changed into aldonic acids—probably through the sugar bisulphite compound and a labile keto sulphonic acid. The waste liquors from pulping with a concentrated cooking acid contain small amounts of sugar sulphonic acids; with a weaker cooking acid, sugar sulphonic acids are also formed but they are not identical with those obtained with the stronger acid. These sulphonic acids are stable in boiling dilute mineral acids and in cold dilute alkalis. Heating fructose under pressure with a bisulphite solution gives a fructose sulphonic acid, whose brucine salt can be obtained pure in a good yield; this is a new type of sugar derivative. The stable sugar sulphonic acids cannot be fermented and appear to have no effect upon the fermentation of glucose. The sugar in sulphite waste liquors, especially in the manufacture of strong pulp, may be present in the form of a bisulphite compound. These compounds cannot be fermented but they markedly retard the alcoholic fermentation. The sugar bisulphite compounds have a stability range of pH 4 to 7. They must be destroyed before fermentation of the liquors. If the waste liquors from strong pulps are alkalinized, the alcohol yield on fermentation may be increased 7 to 10 fold. The presence of sugar sulphonic acids in low molecular weight β -lignosulphonic acids has been demonstrated experimentally.

Digest from "The Action of Sulphite Cooking Acid on Sugars and the Fermentability of Sulphite Waste Liquor of Different Origins," by E. Hägglund, H. Heiwinkel, and T. Bergek, *J. Prakt. Chem.*, 162, No. 1-7, 2-18, Feb. 15, 1943. (Published in Germany.) [From Bulletin of the Institute of Paper Chemistry, 13, No. 10, 415, June 1943.]



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DATA ON METALS

METALS AND ALLOYS DATA BOOK. By Samuel L. Hoyt. Published by Reinhold Publishing Corp., New York 18, N. Y. 334 pages. Price \$4.75.

RELIABLE data on metals and alloys are presented in this book that is "for information, not for instruction." There is little text material, the data being given in 60 graphs and 350 tables. The contents are divided roughly as follows: Introduction, 5 percent; ferrous metals and alloys, 62 percent; non-ferrous, 14 percent; additional metals, miscellaneous data, and index, 19 percent. The book is well bound and printed on sturdy paper to stand up under the constant use that copies are sure to receive.

ALIPHATIC ORTHOESTERS

THE CHEMISTRY OF THE ALIPHATIC ORTHOESTERS. By Howard W. Post. Published by Reinhold Publishing Corp., New York, N. Y. 188 pages. Price \$4.

Reviewed by G. D. Byrkit

THIS A.C.S. Monograph No. 92 summarizes the literature on the esters of orthoformic acid and its homologues, orthocarbonic acid and orthoacids of other elements of Group IV. After an Introduction and a chapter on the preparation of the orthoesters, there follow five chapters on the chemical properties of these useful compounds classified according to the other principal reactants: inorganic and organic acids and derivatives, nitrogen compounds, and organo-metallic compounds and other reactants. A chapter on miscellaneous reactions including particularly halogenations and pyrolyses concludes this group. Interspersed with these chapters is a discussion of orthoacids and esters of carbohydrates. Analogous orthosilicic esters are treated subsequently in two chapters on their preparation, physical and chemical properties. The polyalkoxides of other elements of Group IV receive due notice. The final chapter summarizes briefly the physical properties of numerous orthoesters arranged according to the Richter system by formulas. The book concludes with adequate author and subject indices and each chapter has an extensive bibliography.

The book is well written though a number of errors have been permitted to slip through. Thus the reviewer noted as examples that the last formula on p. 38 should have a central C rather than O; at p. 115 the mention of pyrolysis of phenyl orthoacetate is accompanied by an equation for ethyl orthoacetate; and in the table of physical properties of the aliphatic orthoesters at p. 161, the formula for ethyl orthoacetate—magnesium iodide is given as $C_2H_5O_2$. While these are not serious they give one the uncomfortable feeling that more important and less obvious errors may have also slipped through. The reference (No. 26 in Chap-

ter 2 at p. 42) to Volume 5 of Organic Syntheses is outmoded and the corresponding reference to at least the first edition and preferably the second of Collective Volume 1 of this work should be substituted.

In spite of these criticisms, this monograph is a worthwhile addition to any chemical library. It is certainly the most up-to-date compilation in English of the literature of orthoesters.

FOR AMATEURS

SECRETARY TO THE ENGINEER. By Queena Hazelton. Published by McGraw-Hill Book Co., New York, N. Y. 309 pages. Price \$1.75.

Reviewed by E. M. Rogers

ONE OF The Technical Secretary Series, this volume includes glossaries of terms used in the fields of structural engineering, heating and ventilating, plumbing, electric wiring, mechanical engineering, civil engineering, electrical engineering, chemical engineering, and metallurgy. The corresponding shorthand symbols are shown according to the Gregg system. Accompanying solid-matter dictation in each group is well chosen and should give the student a good foundation for the engineering fields.

To one schooled in the Gregg system, the book will be of definite value; but to those who use the Pitman method of shorthand its usefulness is questionable. It can, however, serve as a handy collection of engineering and technical terms, aside from the stenographic symbols.

FATTY ACIDS AND LIPIDS

BIOCHEMISTRY OF THE FATTY ACIDS. By W. R. Bloor. A.C.S. Monograph No. 93 published by Reinhold Publishing Corp., New York, N. Y. 387 pages. Price \$6.

Reviewed by A. W. Ralston

THE BIOCHEMISTRY of the lipids is a subject which will undoubtedly receive the increased attention of scientists interested in life processes. It is well recognized that the vital role of the lipids in biological reactions has been somewhat overlooked and that this field has not received the attention that it justly deserves. This book is an attempt to assemble and partially evaluate the literature upon this subject and is written by a man who has made numerous contributions to the field. It gives the reader a general knowledge of the apparent biological functions of the various lipid substances, and its extensive bibliography will be found extremely valuable to those who wish to go deeply into the subject.

The book is divided into six chapters, the first of which is a description of the fatty acids and of the simple and compound lipids. The second chapter treats

of digestion and absorption of lipid materials, and the third and fourth chapters of the lipids of the blood and of the tissues respectively. Chapter five is concerned with lipid metabolism, which subject the author has presented in an extremely logical and readable manner. The last chapter discusses the lipids of secretion and excretion.

This book could well be included in the personal libraries of scientists interested in the biological aspects of chemistry. Chemists and biologists working in the field of lipids or of nutrition will find within its pages material of appreciable value.

METALLURGY

ELEMENTARY METALLURGY. By W. T. Frier. Published by McGraw-Hill Book Co., New York, N. Y. 207 pages. Price \$1.75.

STRUCTURE AND PROPERTIES OF ALLOYS. By R. M. Brick and Arthur Phillips. Published by McGraw-Hill Book Co., New York, N. Y. 227 pages. Price \$2.50.

METALLURGICAL PROBLEMS. Second edition. By Allison Butts. Published by McGraw-Hill Book Co., New York, N. Y. 446 pages. Price \$4.

THE FIRST little booklet by Frier presents a well written introduction to metallurgy. Concise language and good organization of the subject matter make for pleasant reading. Profuse illustrations amplify the material which is presented. The chapters contain definitions and questions so that the book may well be used for self instruction by the uninitiated.

"Structure and Properties of Alloys" is a more advanced and specialized text. Its subtitle "The Application of Phase Diagrams to the Interpretation and Control of Industrial Alloy Structures" indicates its scope. Some of the chapter headings may be given to show the organization of this book: Cold Working and Annealing (III); Solid Solutions, Copper-Nickel and Other Useful Systems (IV); Eutectic Alloys, Lead-Antimony Systems, Bearing metals (V); Age-Hardening, Cast and Wrought Aluminum Alloys (VI); Phase-Transformation, Copper-Zinc Alloys (VII); Theory of Heat Treatment of Steels (X); Mono-

RECENT BOOKS RECEIVED

- Chemical Process Principles.** By O. A. Hougen & K. M. Watson. Wiley. \$4.50.
Industrial Chemistry. 3rd ed. By W. T. Read. Wiley. \$5.
Luminescence of Liquids and Solids. By P. Pringsheim & M. Vogel. Interscience. \$4.
Pyrotechnics, Civil and Military. By C. W. Weingart. Chemical. \$5.
Science at War. By G. W. Gray. Harper. \$3.
Synthetic Resins and Rubbers. By P. O. Powers. Wiley. \$3.
Vegetable Fats and Oils. 2nd ed. By G. S. Jamieson. Reinhold. \$4.75.



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tectics, Sintered Metal Powders (XIII). This book also has a great number of excellent photomicrographs and questions are appended at the end of the chapters.

"Metallurgical Problems" is truly an advanced text. It is a collection of 400 work problems which are always explained by means of characteristic examples. These problems are taken from numerous fields, i.e. they deal with the manufacture of coke and producer gas, with the iron blast furnace, with the metallurgy of copper and lead, etc. This practical approach really seems to fulfill admirably the task of "bridging the gap between theory and practice" as the author states in his preface.

INDUSTRIAL RADIOGRAPHY

RADIOGRAPHIC INSPECTION OF METALS. By Otto Zmeskal. Published by Harper & Brothers, New York, N. Y. 150 pages. Price \$2.75.

X-RAY investigation of structural units has become a powerful tool in modern industry. Consequently, the little guide book by Dr. Zmeskal will be welcomed by a large audience. The reader is led, aided by 89 excellent illustrations through chapters on the source of radiation, equipment for industrial radiography, fundamentals of radiographic practice (two parts) and applications. A glossary of terms which is somewhat elementary, selected references and various appendixes conclude the book which no doubt will make many friends.

PIPE-STRESS PROBLEMS

PIPING STRESS CALCULATIONS SIMPLIFIED. By S. W. Spielvogel. Published by McGraw-Hill Book Co., New York, N. Y. 83 pages. Price \$2.50.

IN THIS book the author presents methods for arithmetical solution of pipe-stress problems involving changing temperature conditions. It brings the ordinary layout problem well within the grasp of those who wish practical answers to immediate piping layout problems.

TOUGH AND ROUGH

DANGER, KEEP OUT. By Edward J. Nichols. Published by Houghton Mifflin Co., Boston, Mass. 288 pages. Price \$2.50.

SELDOM are these book review columns used to call the attention of *Chem. & Met.* readers to a work of fiction. "Danger, Keep Out" is strictly fiction. It is, however, a good story for chemical engineers—particularly those interested or connected with the petroleum industry. The central figure, or heroine, is an oil refinery. The tale starts back in the early days of petroleum refining when hunkies earned \$6 for half a day's work hacking carbon out of pressure stills as soon as the temperature was down far enough to let them work—about 275 deg. F. It ends in the time of a few years ago when experiments were being made on tetraethyl lead. Intervening pages are filled with recounting every-day doings at the plant, and what the men thought, did and said.

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ERING

Daily routine is affected by the disastrous fire at Still 8, the advent of working girls at the grease works, the annual company picnic, the plague of efficiency experts, and other unusual happenings which all go to make up an interesting and well-told tale.

From considerable personal experience in an Indiana refinery, the author writes with unobtrusive authority that makes his fiction credible.

MATHEMATICS

VECTOR AND TENSOR ANALYSIS. By Homer V. Craig. Published by McGraw-Hill Book Co., New York, N. Y. 434 pages. Price \$3.50.

Reviewed by F. C. Nachod

THE APPROACH to certain branches of the fields of physics, mathematics and engineering is certainly most elegant by means of vector analysis. A newer outgrowth of this useful tool is tensor analysis, a rapidly expanding field in itself. The author states in his preface:

"With regard to the necessity for economy of time in the training of engineers and physicists, it is of paramount importance that vector analysis be introduced into their program as early as possible and used whenever advantageous." To achieve this purpose best, the author educates the reader in the first of the book's four main sections entitled "Mathematical Background." The reviewer was especially pleased by the well-written chapter V, dealing with determinants, e -systems and transformation equations.

Part B is devoted to vector analysis, Part C to tensor and extensor calculus, and the final Part D gives applications of the methods for classical and relativistic systems.

Definitions are strict and selection of topics is critical. The book can be recommended without reservation to a large audience comprising teacher and student, engineer and physicist.

FOR DRAFTSMEN

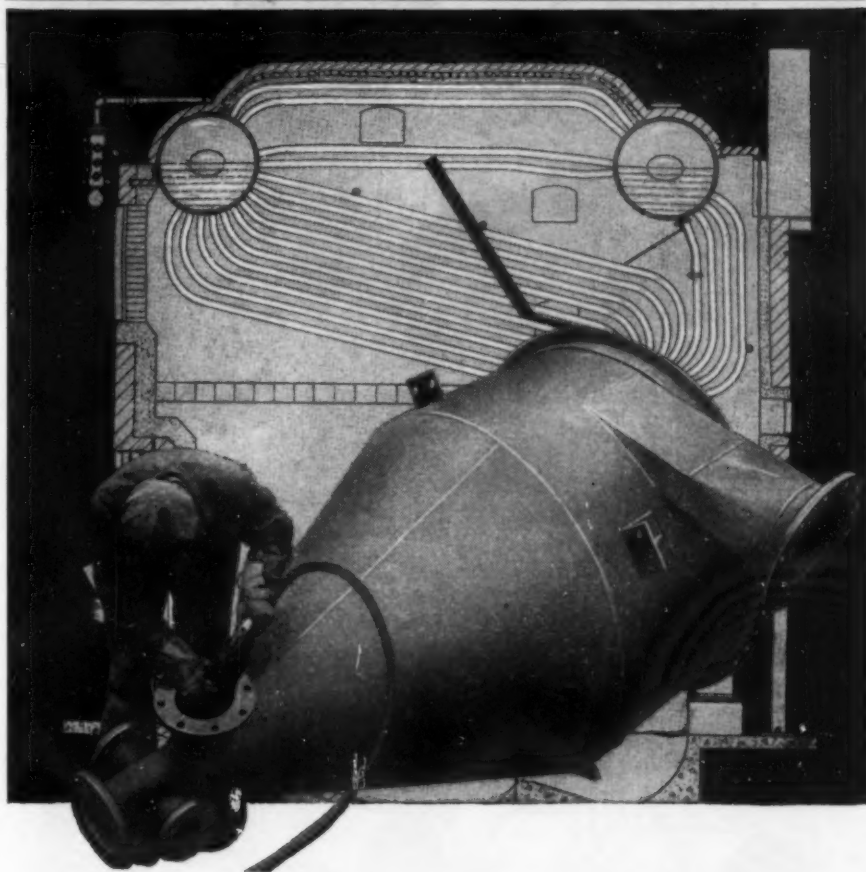
FUNDAMENTALS OF ENGINEERING DRAWING. By W. J. Luzadder. Published by Prentice-Hall, New York, N. Y. 568 pages. Price \$4.

Reviewed by John Porsolt

ONE common fault with most books on the subject of drafting is that they specialize on a few very closely related lines of work. For example, a book on structural steel design will most likely cover structural drafting in detail, but not mention any other closely related subjects. This book covers drafting in almost every general modern field, whether it is piping, structural, sheet metal, topographical, or the most widely covered field of machine drawing.

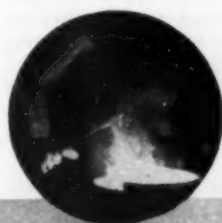
This type of book is especially necessary today, as there is a much greater inter-relation between the various lines of work requiring the draftsman's service than existed several years ago. Each of the several lines of work has its own special technique and methods of indications which have developed over a long period of years. The individual characteristics and styles of these vari-

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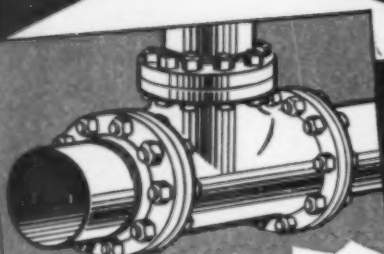
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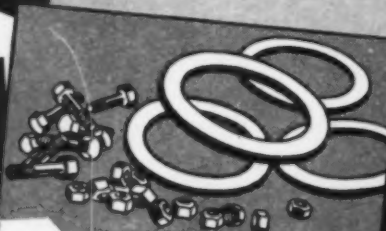
ThredOlets for screwed branch connections.

Socket-End WeldOlets for socket-type welded branch connections.



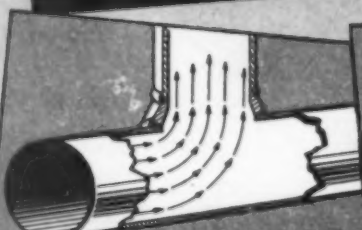
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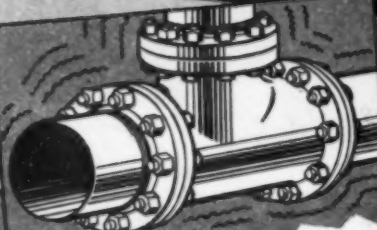
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A most practical and helpful feature is the chapter devoted to shop processes which is almost as worth while as a trip through a machine shop. It gives the reader an excellent idea as to the general methods used to fabricate a piece of work from the finished drawing to the finished machine part.

POSTWAR PROMISES

SCIENCE REMAKES OUR WORLD. By James Stokely. Published by Ives Washburn, Inc., New York, N. Y. 298 pages. Price \$3.50.

EXPLOSIVES, fuel, plastics, rubber, Chemurgy, vitamins and glass furnish subject matter for about half of the chapters in this book written by the conductor of the Herald-Tribune's weekly column "Technical Books." Other subjects include aircraft, radio and electronics, light, photography, atoms, and new sources of power. Needless to say, he predicts a bright future for these products and researches of American engineers and scientists. The author's role is that of reporter. According to his acknowledgments in the preface, he had considerable competent advice from authorities in industry. He gives some historical data and then tells of present activities, pointing out how they are affecting and how they are going to "remake" our everyday world. His facts are well presented without that "wide-eyed wonder" that so often makes this type of book boring or ridiculous.

CHEMICALS IN THE WAR

A MANUAL OF EXPLOSIVES. Volume II. By G. D. Clift and B. T. Fedoroff. Published by Lefax Society, Inc., Philadelphia, Pa. Price \$2.25.

IN THE familiar Lefax format, this little manual is a pocket-size dictionary of explosives. It contains, in alphabetical order, a list of explosive substances and materials connected with their preparation. Literature references and chemical and physical properties are given. In the case of the more important compounds, the entries include considerable detail.

A supplement (priced at \$1) has been issued to correct and bring up-to-date the two Manuals. One page is for Vol. II and there are approximately 110 for Vol. I.

CHEMISTRY IN WARFARE. Revised edition. By F. A. Hessel, M. A. Hessel and J. W. Martin. Published by Hastings House, New York, N. Y. 179 pages. Price \$2.

THE FIRST edition of "Chemistry in Warfare" was published in 1940. (See Chem. & Met., Aug. 1940, p. 579). Since then, events have furnished the authors with new material with which to modify

or amplify their earlier chapters. The only criticism which might be offered is that correction was not carried far enough. For example, they still say that the Graf Spee was sunk "last December" (p. 104) and 50 lb. of toluene are required to produce 1 lb. of T.N.T. (p. 159). Errors of this type give evidence of too much haste in preparing the new edition.

RECENT BOOKS and PAMPHLETS

Salvage Manual for Industry. Available from Superintendent of Documents, Government Printing Office, Washington, D. C. 250 pages. Price 50 cents. Comprehensive illustrated manual on industrial salvage practice.

Training Women for War Work. Obtainable from Apprentice-Training Service, Bureau of Training, War Manpower Commission, Washington, D. C. 15 pages. Prepared for the guidance of training directors, women counselors, and others charged with manning and training responsibilities in war production plants. Gives methods and suggestions for expediting the job.

Preventing Welding and Cutting Fires. Available from International Acetylene Association, 30 E. 42nd St., New York 17, N. Y. 16 pages. Brief discussions of the chief causes of fires and practical measures for their prevention.

Fire Guard Instructor's Manual. OGD Publication 2017. Prepared by the Education Unit of the Fire Defense Section of the United States Office of Civilian Defense, Washington, D. C. 120 pages. Contains eight lessons to be used by instructors for teaching fire guards.

Production Management. Issued by the Bedaux Co., Inc., Chrysler Building, New York, N. Y. 36 pages. Non-technical explanation of the production management methods employed by the Bedaux organization which are in use in approximately 1,000 industrial plants.

Multipled Manpower. Available from the Production Service Branch, Ordnance Department, Pentagon Building, Washington, D. C. A number of booklets are available to help stimulate suggestions and ideas on saving of material, manpower and machine hours. Titles are: Tremendous Trifles, Metallurgency, Battle-necks, and Another Tremendous Trifle.

Chromium Plating. Information Release No. 4, published by War Metallurgy Committee, 2101 Constitution Ave., Washington 25, D. C. 71 pages. An abridged version of a report on the industrial uses of chromium plating prepared by M. Kolodney. A bibliography and correlated abstract of the published literature.

How to Teach Fire Fighting. Published by Walter Kidde & Co., 140 Cedar St., New York, N. Y. 15 pages. How to conduct demonstrations of fire-fighting methods.

Sanitary Products. By L. B. Schwarcz. Published by McNair-Dorland Co., 254 W. 31st St., New York, N. Y. 312 pages. Price \$5. Manufacture, testing and use of disinfectants, soaps, insecticides, deodorants, etc.

Civilian Preparedness for Chemical Warfare. Published by the Journal of Chemical Education, Easton, Pa. 44 pages. Price 50 cents. A symposium consisting of 12 articles reprinted from the Journal.

Operation and Maintenance of Magnetic Pulleys. Published by Dings Magnetic Separator Co., 509 E. Smith St., Milwaukee 7, Wis. 39 pages. A manual to help industry secure better separator performance.

Absenteeism. Published by Summerill Tubing Co., Bridgeport, Pa. 23 pages. A manual outlining methods which have proved effective in reducing absenteeism at Summerill.

Industrial Heat and Power Conservation Manual. Prepared by Industrial Mineral Wool Institute, 441 Lexington Ave.,

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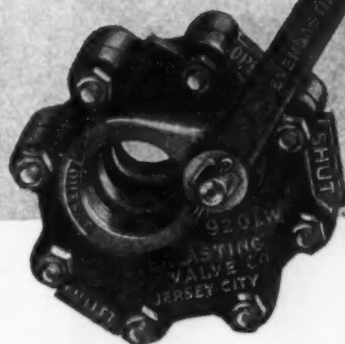
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Chemistry and the Aeroplane. By V. J. Clancey. Published by the Ronald Press

Co., New York, N. Y. 176 pages. Price \$2.25. Contains nine chapters: Making Flight Possible, Petrol, Substitute Fuels, Petrol plus Engine, Steel, Non-ferrous Alloys, Plastics, Chemical Energy, The Gas Laws, Behaviour of Gases, Accessories.

GOVERNMENT PUBLICATIONS

The following recently issued documents are available at prices indicated from Superintendent of Documents, Government Printing Office, Washington, D. C. In ordering publications noted in this list always give the complete title and the issuing office. Remittances should be made by postal money order, coupons, or check. Do not send postage stamps. All publications are in paper cover unless otherwise specified. When no price is indicated, the pamphlet is free and should be ordered from the Bureau responsible for its issue.

Bibliography of Agriculture. Issued monthly by U. S. Department of Agriculture Library, this lists all of the literature on agriculture and closely related subjects received by the Library, and covers more than twelve thousand periodical and serial publications as well as thousands of books, pamphlets, and government documents in this field. Each monthly issue includes an author and subject index, and a cumulative index will be issued at the end of each year. Including the annual index, it is estimated that the Bibliography will total approximately 2,400 pages annually. Subscription price \$3.75 per year. Price of single copies 35 cents.

Rate of Temperature Change in Laminated Timbers Heated in Air Under Controlled Relative Humidity Conditions. By J. D. MacLean. Forest Products Laboratory, Madison, Wis. No. R1434. Mimeographed.

Preprints from Minerals Yearbook for 1942, from U. S. Bureau of Mines, are now available as follows: Natural Gas, Sand and Gravel. Cement. Lime. Statistical Summary of Mineral Production. Stone. Price 10 cents each. Employment and Accidents in the Mineral Industries. Price 5 cents.

Strategic Mica. By G. Richards Gwinn. Bureau of Mines. Information Circular I. C. 7258. Mimeographed.

Bag-Molding of Plywood. By Bruce G. Heebink. Forest Products Laboratory, Madison, Wis. No. R1431. Mimeographed.

Directory of the Bureau of Animal Industry, Corrected to July 1, 1943. U. S. Dept. of Agriculture. Price 10 cents.

Production and Fertilizer Use of Urea. By Albert R. Merz and Bailey E. Brown. U. S. Dept. of Agriculture, Circular No. 679. Price 5 cents.

Fires in Surface Mining and Milling Structures. By D. Harrington and J. H. East, Jr. Bureau of Mines. Information Circular I. C. 7250. Mimeographed.

First Organization and Work of the Coal-Mine Inspection Division, Bureau of Mines. Bureau of Mines. Information Circular I. C. 7243. Mimeographed.

Supplementing Anthracite with Other Fuels for Home Heating. By W. T. Reid. Bureau of Mines. Information Circular I. C. 7260. Mimeographed.

Inflammability of Methylenedichloride-Oxygen-Nitrogen Mixtures. By G. W. Jones, R. E. Kennedy, and F. E. Scott. Bureau of Mines. Report of Investigations R. I. 3727. Mimeographed.

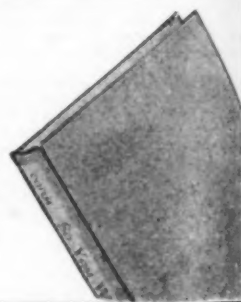
Inflammability and Explosibility of Metal Powders. By Irving Hartmann, John Nagy, and Hyllton R. Brown. Bureau of Mines. Report of Investigations R. I. 3722. Mimeographed.

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Magnolia Oil Field, Columbia County, Ark. Part I, Petroleum-Engineering Study; by Charles B. Carpenter and H. J. Schroeder. Part II, Derivation and Application of Material-Balance Equations; by Alton B. Cook. Bureau of Mines. Report of Investigations R. I. 3720. Mimeographed.

Effect of Acids and Alkalies Upon Carbonization Products of Coal. By R. E. Brewer. Bureau of Mines. Report of Investigations, R. I. 3726. Mimeographed.

Aniline Points of Hydrocarbons. By John S. Ball. Bureau of Mines. Report of Investigations, R. I. 3721. Mimeographed.

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Oil and Gas Fields of the United States (A map in two sheets, each 42 by 52 inches). By W. G. Pierce, Jane Hanna, and E. J. Aberdeen. Sold by the Director of the Geological Survey, Washington, D. C. Price \$1.00.

Manganiferous and Ferruginous Chert in Perry and Lewis Counties, Tennessee. By Ernest F. Burchard. Geological Survey, Bulletin 928-D. Price 25 cents.

Water Levels and Artesian Pressure in Observation Wells in the United States in 1941. Part 6, Southwestern States and Territory of Hawaii. By O. E. Meinzer, L. K. Wenzel, and others. Geological Survey, Bulletin 941. Price 40 cents.

Relative Abundance of Nickel in the Earth's Crust. By Robert Clark Wells. Geological Survey, Professional Paper 205-A. Price 10 cents.

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The United States in the World Economy. By Hal B. Lary. Bureau of Foreign and Domestic Commerce. Economic Series No. 23. Price 35 cents.

Refrigeration. War Department, Technical Manual No. 10-610. Price 20 cents.

Silver in Wartime. U. S. Tariff Commission. Mimeographed.

Stock Piles of Strategic Minerals. Hearings on S. 1160. 78th Congress, 1st Session. Senate Mines and Mining Committee. Price 15 cents.

Synthetic Liquid Fuels. Hearings on S. 1243. 78th Congress, 1st Session. Senate Committee on Public Lands and Surveys. Price 75 cents.

Development of Mineral Resources of the Public Lands of the United States. Hearings on S. Res. 53. 77th Congress, 1st and 2nd Sessions. Senate Committee on Public Lands and Surveys. In 4 parts: Part 1—Mineral Resources; Price \$1.25. Part 2—Oil; Price 10 cents. Part 3—Oil; Price 35 cents. Part 4—To Encourage the Discovery of Oil and Gas on the Public Domain; Price 30 cents.

Post-War Economic Policy and Planning. Report of the Special Committee on Post-War Economic Policy and Planning. 78th Congress, 1st Session. Senate Document No. 106. Price 15 cents.

Brand Names. Hearings on H. Res. 98. 78th Congress, 1st Session. House Interstate and Foreign Commerce Committee. Price 55 cents.

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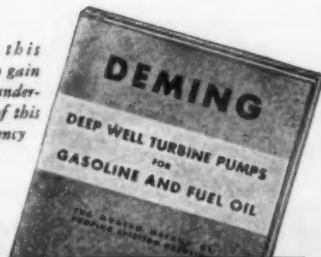


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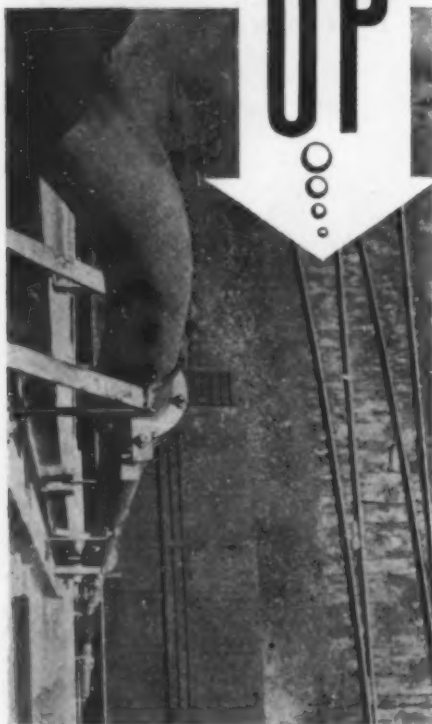
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Publications listed here are available from the manufacturers themselves, without cost unless a price is specifically mentioned. To limit the circulation of their literature to responsible engineers, production men and executives, manufacturers usually specify that requests be made on business letterhead.

Heat Transmission. The Atlas Lumnite Cement Co., 135 East 42nd St., New York 17, N. Y.—16-page booklet entitled "Heat Transmission Through Furnace Walls." Includes charts to simplify the solution of heat-transfer problems in connection with refractories and high-temperature insulation such as fire-brick, insulating brick, refractory concrete, etc. Also contains information on the conductivity factors of some common refractory materials and extensive engineering data in chart form.

Furnace Maintenance. Harbison-Walker Refractories Co., Farmers Bank Bldg., Pittsburgh 22, Pa.—6-page form dealing with this concern's "H-W Magnamix," a magnesite ramming mixture of especial interest to operators of open hearth and electric steel furnaces for new bottoms and maintenance of existing bottoms. The material also serves as a monolithic inner lining in non-ferrous metallurgical furnaces where the requirements are for a highly basic refractory. Illustrated.

Pneumatic Control. The Bristol Co., Waterbury 91, Conn.—Instruction A1000—20-page booklet entitled "Air Control Theory and the Free Vane Controller" which covers basic theory and principles common to the five types of free vane air controllers put out by this concern. Gives a clear exposition of pneumatic control principles and their application to free vane controllers. Illustrated with diagrammatic sketches.

Agitators. Eclipse Air Brush Co., Inc., 390 Park Ave., Newark, N. J.—24-page booklet dealing with this concern's line of "Pneumix" air-motored agitators. Contains numerous installation photographs

and a brief description of each application. Each unit is illustrated and described briefly. Includes prices.

Laminated Plastics. Continental-Diamond Fibre Co., Newark, Del.—42-page booklet dealing with this concern's "Dilecto" laminated phenolic plastic. Contains extensive information on minimum and maximum standards of properties, applications in various industries, different grades of products, methods of machining, tolerances, etc. Contains extensive application data in chart form.

Power Transmission. Cling Surface Co., 1048 Niagara St., Buffalo, N. Y.—32-page booklet entitled "Is Industry's Power Transmission Program Geared to War Production Demand?" Designed to show the necessity for and benefits of a planned power transmission program, the necessity for a planned maintenance program, and of salvaging and re-using power transmission equipment. Written concisely and in simple style. Contains numerous sketches to illustrate the text material. Well organized.

Automatic Proportioning. Proportioners, Inc., 9 Coddling St., Providence 1, R. I.—Bulletin 1700—8-page booklet dealing with the line of automatic proportioning equipment for the process industries put out by this concern. Includes illustrations and brief descriptive material on equipment for treating, blending, diluting, sampling, etc., for water treatment, plastic operation, synthetic rubber, aviation gasoline, etc. Well illustrated with diagrammatic drawings.

Pressure Maintenance. Clark Bros. Co., Inc., Olean, N. Y.—8-page reprint dealing

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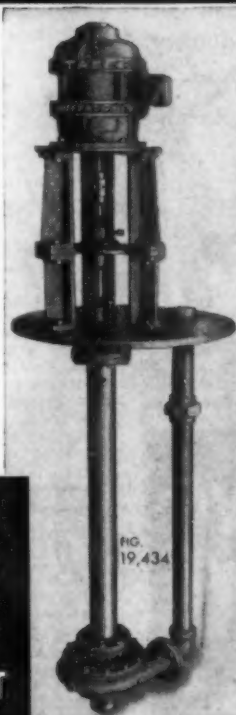
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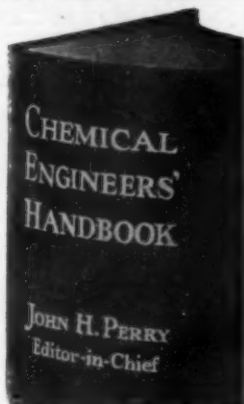
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with results after six years of a pressure
maintenance project of the Continental
Oil Co. in Louisiana. Well illustrated
with photographic reproductions and
diagrammatic sketches.

Pumps. Watson-Stillman Co., Roselle,
N. J.—Bulletin 250A—6-page form illus-
trating and discussing briefly this con-
cern's line of "Steadiflo" hydraulic pres-
sure pumps. Contains installation photo-
graphs, diagrammatic sketches, dimension
data and specifications.

Laboratory Presses. The Watson-Still-
man Co., Roselle, N. J.—Bulletin 350A—
6-page form illustrating and discussing
briefly this concern's line of hydraulic
laboratory presses and equipment. Con-
tains dimension tables.

Electric Instruments. General Electric
Co., Schenectady, N. Y.—Form GET-
1173—20-page publication dealing with
the principles of operation for electric
instruments. Presents a concise discus-
sion of characteristics of instruments,
operating principles, and individual limita-
tions of the various types. Very well
illustrated with sketches and diagramma-
tic drawings on the various types of d. c.
and a. c. instruments.

Laboratory Chemicals. The Harshaw
Scientific, Division of Harshaw Chemical
Co., 1945 E. 97th St., Cleveland, Ohio.—
72-page spiral-bound booklet listing the
extensive line of laboratory chemicals
carried by this concern, together with
prices in various quantities. Also illus-
trates and describes briefly certain labora-
tory instruments and apparatus. Con-
tains an abbreviated list of standard
volumetric and special solutions.

Industrial Waste Treatment. The Jef-
frey Mfg. Co., Columbus 16, Ohio—Catalog
775—40-page booklet dealing with the
line of equipment put out by this con-
cern for water, sewage, and industrial
waste treatment plants. Contains numer-
ous installation photographs with a brief
description of each. Also includes illus-
tration, brief discussion and diagramma-
tic drawing on each of the pieces of
equipment, together with data on dimen-
sions, power and water requirements, etc.
Contains extensive engineering data.

Instruments. Ballou Service & Instru-
ment Co., Inc., 75 West St., New York,
N. Y.—Catalog 5—16-page booklet illus-
trating and describing briefly the line of
"Balco" marine, industrial and refinery
products put out by this concern. Also
includes photographs of the concern's
shop facilities.

Die Castings. The New Jersey Zinc Co.,
160 Front St., New York, N. Y.—14-page
reprint entitled "Factors To Be Con-
sidered When Designing Die-Castings."
Contains numerous tables of engineering
data, diagrammatic drawings, and photo-
graphic reproductions.

Refrigeration. York Corp., York, Pa.
—Volume 1, No. 2, of this concern's pub-
lication "Cold Magic," which is devoted
to the applications of refrigeration and
air conditioning in industry and the
armed services and the part that this
concern has played in development of the
field. Contains an article on redesigned
shell and tube evaporators. Extensively
illustrated.

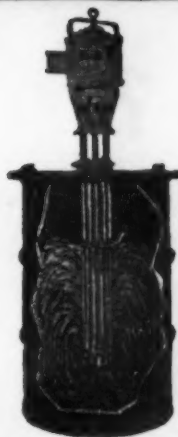
Steam Costs. Cleaver-Brooks Co., Mil-
waukee 9, Wis.—Sturdy cardboard steam
cost calculator built on the slide rule
principle. Simple and quick to operate.

Oil Burners. National Alroil Burner
Co., Inc., 1284 East Sedgley Ave., Phila-
delphia 34, Pa.—Bulletin 21—16-page
catalog dealing with the type SA steam
atomizing oil burners and auxiliary equip-
ment put out by this concern for use
with heavy oil or tar in boilers, stills,
dryers and other furnaces. Extensively
illustrated with photographic reproduc-
tions of the units and their applications.

Tools. Vascloy-Ramet Corp., North
Chicago, Ill.—Catalog 227—24-page cata-
log illustrating and describing briefly the
line of tools of the "Tantung" type, in-
cluding bits, boring tools and rounds, etc.
Contains extensive tables of dimensions,
list prices and numerous diagrammatic
sketches.

Liquid Level Controls. B/W Controller
Corp., Birmingham, Mich.—Catalog 943—
28-page catalog featuring the all-electric
floatless liquid-level control put out by

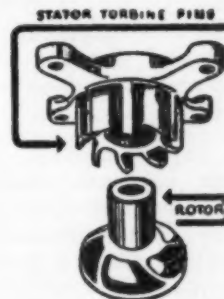
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angle, no vibration.

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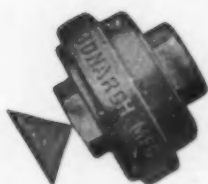


Fig. 645

Are your scrubbing nozzles as efficient as you think they could be? Do they resist the corrosion or wear conditions satisfactorily? Produce the breakup and distribution you would like?

Right now thousands of Monarch Fig. 645 nozzles are scrubbing all kinds of gases all over the world. . . Perhaps they can do a better job for you!

Outline your spray problem for us—If your liquid can be sprayed with direct pressure at all—Monarch can furnish the nozzles.

NOZZLES FOR:

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- HUMIDIFYING
- AIR WASHING
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- SPRAY PONDS
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- ACID CHAMBERS
- CONCRETE CURING

WRITE—While you think of it.

MONARCH MFG. WKS, INC.
2730 E. WESTMORELAND ST.
PHILADELPHIA 34, PA.

this concern. Includes diagrammatic set-ups, prices and specifications, data on special controls and panels, wiring and application diagrams. Contains considerable engineering information.

Industrial Instruments. Moore Products Co., H and Lycoming Sts., Philadelphia, Pa.—Catalog 5—20-page catalog dealing with this concern's "Nullmatic" industrial instruments using the pneumatic "Null" balance system. Includes illustrations and discussions of flow and liquid level instruments, liquid level gages and controllers, valve positioners, etc. Extensively illustrated with photographic reproductions and cross-sectional diagrams. Contains tables of principal dimensions.

Pressure Controls. Askania Regulator Co., 1603 So. Michigan Ave., Chicago, Ill.—Bulletin 100—16-page booklet dealing with this concern's line of pressure controls which describes applications of regulator equipment to pressure and flow control problems. Includes installation photographs and diagrams and a sizing chart for butterfly valves.

Water Level Indicators. Yarnall-Waring Co., Chestnut Hill, Philadelphia 18, Pa.—Bulletin WG1820—8-page folder illustrating and describing briefly this concern's line of remote water level indicators. Contains numerous photographic reproductions and diagrammatic drawings.

Welding. Allegheny Ludlum Steel Corp., Brackenridge, Pa.—64-page booklet in color dealing with the welding of stainless steels. Contains information on effect of heat on stainless steels, metallic arc welding, atomic hydrogen welding, oxygen-acetylene welding, electrical resistance welding, and welding "Pluramelt" steel. Extensively illustrated with colored drawings and photographic reproductions. Contains numerous tables of engineering data. Well written and organized.

Valves. The Edward Valve & Mfg. Co., Inc., East Chicago, Ind.—4-page folder illustrating and describing briefly this concern's line of standardized steel valves of various types.

Fluid Straining. B. F. Drakenfeld & Co., Inc., 45-47 Park Place, New York, N. Y.—Folder describing briefly the principles and outstanding advantages of the "Rotospray" for straining fluids of all types. Contains information on capacity, dimensions and weight. Includes a cross-sectional drawing.

Hydrocarbons. Phillips Petroleum Co., Special Products Division, Bartlesville, Okla.—Bulletin 96A—8-page booklet which lists the new hydrocarbon products of this concern. Includes data on specifications, typical properties, shipping containers and price schedules of pure propylene, pure butene-1, pure butene-2, commercial isohexanes, isooctanes and normal heptane.

Concrete Floor Patch. Agatex Corp., 1170 Broadway, New York 1, N. Y.—4-page bulletin on the advantages and application of this concern's "Agapatch" concrete floor patch for industrial uses requiring resistance to acids, strong alkalis, oils and greases and heavy trucking.

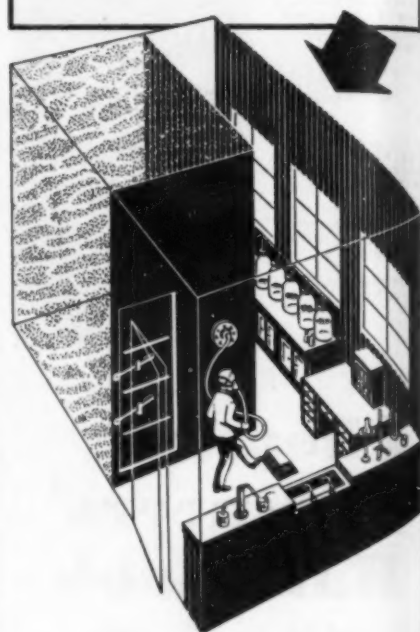
Piston Pumps. Warren Steam Pump Co. Inc., Warren, Mass.—Bulletin 230-1—4-page form illustrating and describing this concern's horizontal duplex piston pumps of the "Realwear" type. Includes data on capacities.

Level Control. Photoswitch, Inc., 77 Broadway, Cambridge 42, Mass.—Sheet 1100—2-page form illustrating and describing briefly this concern's floatless level control for liquids and powders. Contains three diagrammatic drawings on typical applications.

Proportioning Equipment. Cochrane Corp., 17th and Allegheny Aves., Philadelphia 32, Pa.—Publication 2985A—4-page form describing this concern's proportioning equipment for sulphuric acid and other corrosive fluids. Discusses briefly principles of operation, advantages, and applications. Illustrated by diagrammatic drawings.

Electronic Heaters. General Electric Co., Schenectady, N. Y.—Bulletin GEA-4076—8-page bulletin featuring the electronic method of heating metals, and giving in detail the specifications of the 5-kw. and the 15-kw., 550-kilocycle electronic heaters. Also includes illustrations of small parts which may be brazed,

The gas chamber that lengthens life



In this gas chamber you could meet, at one time or another, all the gases that afflict industry and threaten its workers' lives.

Here Willson scientists add to their knowledge of lethal vapors, and how to make them harmless. Here they test the masks and respirators on whose unfailing performance human beings stake their lives. This is a fearful responsibility; and the Willson life-lengthening gas chamber is only one of countless ways by which that responsibility is discharged.

All Willson protection is scientifically engineered to yield the utmost in safety and comfort. That is why so many Safety Directors and Purchasing Agents specify Willson for head, eye and lung protective equipment.

For 73 years Willson has been a leader in preventing industrial accidents.



WILLSON APPROVED UNIVERSAL GAS MASK

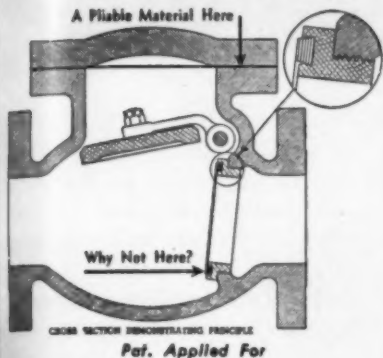
Approved by Bureau of Mines for protection against the great variety of poisonous gases, smokes and vapors—including carbon monoxide—resulting from industrial operations.

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WHEATLEY'S "Syn-Rub-Seal"



SYNTHETIC RUBBER SEAL FULL OPENING, SWING CHECK VALVE

Equipped with Wheatley Synthetic Seal—a synthetic rubber ring dovetailed and fitted into a removable bronze seat also dovetailed to accept this rubber ring. When the bronze clapper falls against this rubber, a perfect seal is formed regardless of what irregularities have deposited on the seat or in the fluid, such as sand, scale and cuttings which under pressure ordinarily would completely cut out a hard-surfaced seat.

Preferred by the United States Engineers on projects handling high octane gasoline.

Sizes 2" to 24"
Pressures
125 lbs. to 2000 lbs.
Series 15-30-40-60
and Ludlow
FBE - SBE - SOE & FOE
Steel-Iron-Bronze

- The rubber ring conforms to all deposits and obstacles and makes it possible for this valve to seal under the worst conditions.
- Seals regardless of viscosity.
- Operates equally well on kerosene or crude.
- Absolutely silent in operation. Ideal for refineries and pumping stations where the slapping of metal check valve clappers is annoying.
- No lapping or grinding of seats necessary.
- Renewable bronze seat ring, into which the rubber ring is inserted, can be replaced by the standard metal to metal seat, if desired.

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PUMP and VALVE MFR.
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soldered or surface hardened by electronic heating. Extensively illustrated.

Full-View Fittings. Henry E. Jacoby, 205 E. 42nd St., New York 17, N. Y.—Bulletin 43—8-page booklet illustrating and describing the line of full-view fittings, such as flow glasses and sight tubes, put out by this firm. Includes data on sizes and dimensions.

Alloys. The Elmco Corp., Salt Lake City 8, Utah—4-page form announcing this concern's new alloy "Utaloy" steel for casting purposes. Describes briefly composition and advantages of this alloy.

Mixers. Edge Moor Iron Works, Edge Moor, Del.—Bulletin 117—4-page form illustrating and describing briefly the line of horizontal mixers and blenders put out by this concern. Contains photographic illustrations and cross-sectional drawings.

Flowmeters. Cochrane Corp., Philadelphia, Pa.—Reprint 25—An 8-page manual, "How To Keep Flowmeters Accurate", dealing with correct installation and maintaining accuracy. Well illustrated with diagrams, and contains engineering data.

Water Conditioner. American K. A. T. Corp., 331 Madison Ave., New York 17, N. Y.—A 4-page bulletin describing the all-colloidal action of K. A. T. water conditioner for laboratory stills, and its prevention of scale formation, corrosion, and foaming in the stills.

Oil Purifiers. Youngstown Miller Co., Sandusky, Ohio.—Bulletin YM 600—A new 6-page bulletin describing and diagramming this concern's "A" and "GH" lines of lubrication and hydraulic oil reclaimers.

Furnaces. Hevi Duty Electric Co., Milwaukee, Wis.—Bulletin HD 643—A 10-page publication entitled "Protective Combusted Atmospheres in Hevi Duty Furnaces". Each of this concern's furnace models are described and illustrated. Diagrams and engineering data are included.

Oil Separating. Cochrane Corp., Philadelphia, Pa.—Reprint 24—This 3-page reprint emphasizes the importance of selecting oil not only for its lubricating properties but also for its subsequent removal facility. Includes considerable engineering data. Also Reprint 26, giving new sizing data on relief valves used for low pressure equipment. Includes data to show how size and permitted pressure drop affect capacity. Includes engineering charts.

Valve Operators. Automatic Temperature Control Co. Inc., Philadelphia, Pa.—Bulletin A5—Constructional and performance data in this 4-page bulletin deals with this concern's "Type 3" valve operators for regulating temperature, pressure flow, etc. Also Bulletin A8 covering "ATC Type 303" valve operators, and Catalog A4 covering "Type 2" valve operators. All three bulletins include engineering data and diagrams.

Resinates. Hercules Powder Co., Wilmington, Del.—4-page folder which discusses properties and uses of "Dresinates," this concern's water soluble resinates, in both powder and liquid form. Includes tables on properties to show improved stability of emulsions as well as directions for preparing a typical emulsion.

Metal Coating. Rapid Electroplating Process, Inc., 1414 S. Wabash Ave., Chicago, Ill.—Folder and price list explaining the rapid metal coating process for use on bus bars, lugs and other electrical equipment parts.

Heat Exchangers. Brown Fintube Co., Elyria, Ohio.—Bulletin 432—The newly improved type "BFT-1" sectional hairpin heat exchanger is described and illustrated in this 6-page bulletin. Dimensional tables are given and the non-removable rear end assembly discussed.

Hydro-Alketyl Alcohol. Hercules Powder Co., Wilmington, Del.—Bulletin 927—An 8-page bulletin on the physical and chemical properties of hydro-alketyl alcohol. Discusses applications for this rosin-derived alcohol for protective coatings, resins, etc.

Tube Cleaners. Elliott Co., Jeannette, Pa.—Bulletin Y 15—A 4-page bulletin discussing briefly the new "1300" series tube cleaner put out by this company.

FOR THE DEFENSE OF DEMOCRACY
THE BEST IS NONE TOO GOOD

FRANCE PACKING

has a
"Ring of Distinction"



Imitated but never duplicated, the France ring is manufactured in three sections. The contacting faces form the lines of an equilateral triangle. As the ring is expanded or contracted, the sections must move in or out radially equal distances from the center of the rod to which the ring is fitted.

This fundamental mechanical principal accounts for the efficiency, trouble-free performance and extra-long life of France Metal Packing.

After years of service, when the rings have become worn to such an extent that the sections nearly butt together, further years of additional service can be obtained by cutting off the narrow points of the three sections where they form a part of the inner circumference of the ring.

The spring then requires adjustment so that the sections are held to the rod with a slight tension.

For installation in engines, pumps and compressors—under all conditions of service, France Full-floating Metal Packing means true economy in the long run.

Permit France Engineers to analyze your packing requirements. Write for Catalog M-4.



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METAL PACKING

USE DISTILLED WATER?



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HERE'S A LOW-COST SUBSTITUTE!

YOU'LL be glad to know about these ion exchange materials. For they produce—*chemically*—a water suitable for most applications for which commercial distilled water is satisfactory. Yet the cost runs as low as 5% of the cost of distillation!

Shown at the left is ZEO-KARB H*, Permutit's acid-regenerated cation exchanger. In the new Demineralizing process, it replaces metallic cations with hydrogen ion, converting the salts present into corresponding acids. At the right is DE-ACIDITE*, Permutit's resinous anion exchanger. It removes from solution the acids formed in the ZEO-KARB step. Thus a water practically free of both cations and anions is produced—*without costly distillation!*

Permutit Demineralizers operate at maximum efficiency because Permutit manufactures both the equipment and the ion exchange materials. And built into each installation is a long experience in water conditioning, dating back to the introduction of base exchange zeolites by Permutit 30 years ago.

Write for a free bulletin to The Permutit Company, Dept. K, 330 West 42nd Street, New York 18, N. Y. In Canada: Permutit Company of Canada, Ltd., Montreal. *Trademark Reg. U. S. Pat. Off.



**WATER CONDITIONING
MATERIALS AND EQUIPMENT**

**ION EXCHANGERS
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LOUISVILLE **GRANULES** **DRYER (\$15,000)** **IMPROVES A** **COMPETITOR'S (\$60,000)** **INSTALLATION!**

For many years, most production engineers have been perfectly willing to grant that Louisville Dryers are the most carefully engineered, most efficient dryers available in America. "Always engineer for operating economy rather than for low first cost" has been almost a slogan with us. . . . But here is a case in which a Louisville Dryer costing only \$15,000 actually outperforms a \$60,000 "competitive" dryer by producing a 50% greater output, in 60% less space, and with an annual saving of \$21,000 in drying costs!

FORMER DRYER	
Installed cost . . .	\$60,000
Annual production (tons) . . .	6,000
Drying cost per ton	\$4.65
(Space required, 2500 sq. ft.)	
LOUISVILLE DRYER	
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Drying cost per ton	\$1.15
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YEARLY SAVINGS OF LOUISVILLE DRYER, IN OPERATING COSTS ALONE	
	\$21,000

Read the highlights, in the "blueprint" at the left—then drop us a line for a description of the *methods* Louisville uses to assure you of better performance—in *advance of purchase*. We would be very greatly pleased to extend to you the same research facilities, and the same pilot-plant experimentation that made this particular record possible. *Address:* Louisville Drying Machinery Co., Incorporated, 451 Baxter Avenue, Louisville 4, Ky. (Subsidiary of General American Transportation Corp.)

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CHEMICAL

ECONOMICS AND MARKETS

PRODUCTION DATA FOR SPECIFIED CHEMICALS WILL BE MADE PUBLIC AT REGULAR INTERVALS

REVERSING the procedure which has been followed in the last two years, it was announced last month that the Chemicals Division of WPB would make public monthly production figures for a selected group of chemicals. The first report issued Nov. 22 shows production for August together with comparisons for the preceding month and the corresponding month of 1942. Publication of these figures should prove of value to the industry in determining some of the trends that exist in important products and in some cases give an indication of capacities which knowledge may be useful in planning postwar activities. It is intended to expand the list as first reported, so as to serve a larger segment of the industry. Figures for the preliminary list follow, the quantities referring to short tons:

	Aug. 1943	July 1943	Aug. 1942
Calcium carbide	54,133	51,549	41,381
Chlorine	133,650	132,579	114,499
Caustic soda			
Electrolytic	105,246	103,998	78,499
Lime soda	81,941	80,051	49,571
Sulphuric acid			
100 percent	254,993	240,957	298,252
Chamber contact	306,391	302,156	301,659
Potash			
100 pc KC1	91,619	83,493	70,613
Superphosphate			
Normal and wet	545,215	509,717	—
Concentrated	24,990	18,304	—

Production of the following chemicals is on a basis of 100 pounds:

	Aug. 1943	July 1943	Aug. 1942
Copper sulphate	13,986	14,064	14,916
Carbon black	30,958	30,898	—
Butyl alcohol	11,544	9,089	10,610
Phenol			
Synthetic	15,197	16,216	11,456
Natural	2,154	1,945	1,946
Aniline	8,528	8,319	8,904
Phthalic anhydride	9,567	8,481	7,574
Acetic acid			
Natural	4,177	4,178	4,189
Synthetic	28,687	27,194	22,926
Acetic anhydride	39,253	38,500	36,501
Acetone	29,075	25,933	26,444
Formaldehyde	43,626	44,036	31,826
Isopropyl alcohol	35,029	32,931	28,958

Some expansion of sulphuric acid facilities will be undertaken to meet the requirements of the fertilizer and high octane gasoline programs according to a late November WPB announcement. Excess capacity of the Army ordnance explosives plants will be diverted to the fertilizer industry for the production of superphosphate to meet an estimated increase in demand for next year of 40 percent.

Production of sulphuric acid in commercial plants currently is at the rate of 7,900,000 tons per year, up 55 percent from 1939.

While there has been some slowing up in productive activities in recent weeks in some lines, the *Chem. & Met.* index shows that industrial consumption of chemicals increased in October over the preceding month but November operations again turned downward. The index number for October is 181.07 which compares with a 177.02 for September and with 174.08 for October 1942.

The textile industry, which has been adversely affected by the scarcity of skilled workers has been going ahead at a rate considerably under its peak. Consumption of rayon has been high but cotton mills have consumed relatively smaller amounts of the staple. Production of carpet wools has been subnormal for a long time and while controls have been removed for its use in floor coverings it is held that the move will make little difference as the supply of carpet wool is too small to admit of much improvement in its consumption in the near future. The more favorable outlook for apparel wool as the result of removal of restrictions is largely offset by the fact

Chem. & Met. Index for Industrial Consumption of Chemicals
1935=100

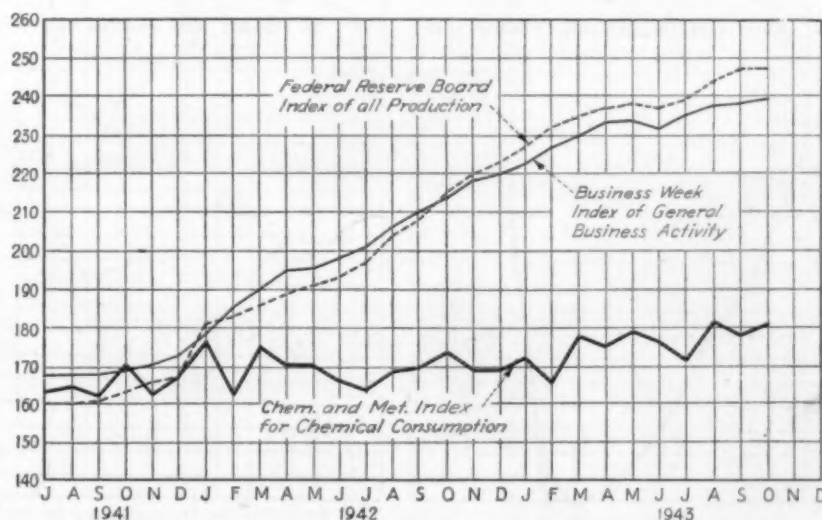
	Sept. revised	Oct.
Fertilizers	38.73	40.00
Pulp and paper	18.40	18.77
Petroleum refining	16.41	16.79
Glass	18.80	20.60
Paint and varnish	16.02	15.60
Iron and steel	13.56	14.14
Rayon	15.77	15.86
Textiles	11.10	10.90
Coal Products	9.71	9.76
Leather	4.30	4.35
Industrial explosives	6.12	6.00
Rubber	3.00	3.00
Plastics	5.10	5.30
	177.02	181.07

that quotas had been less stringent and mills had been able to maintain near capacity schedules.

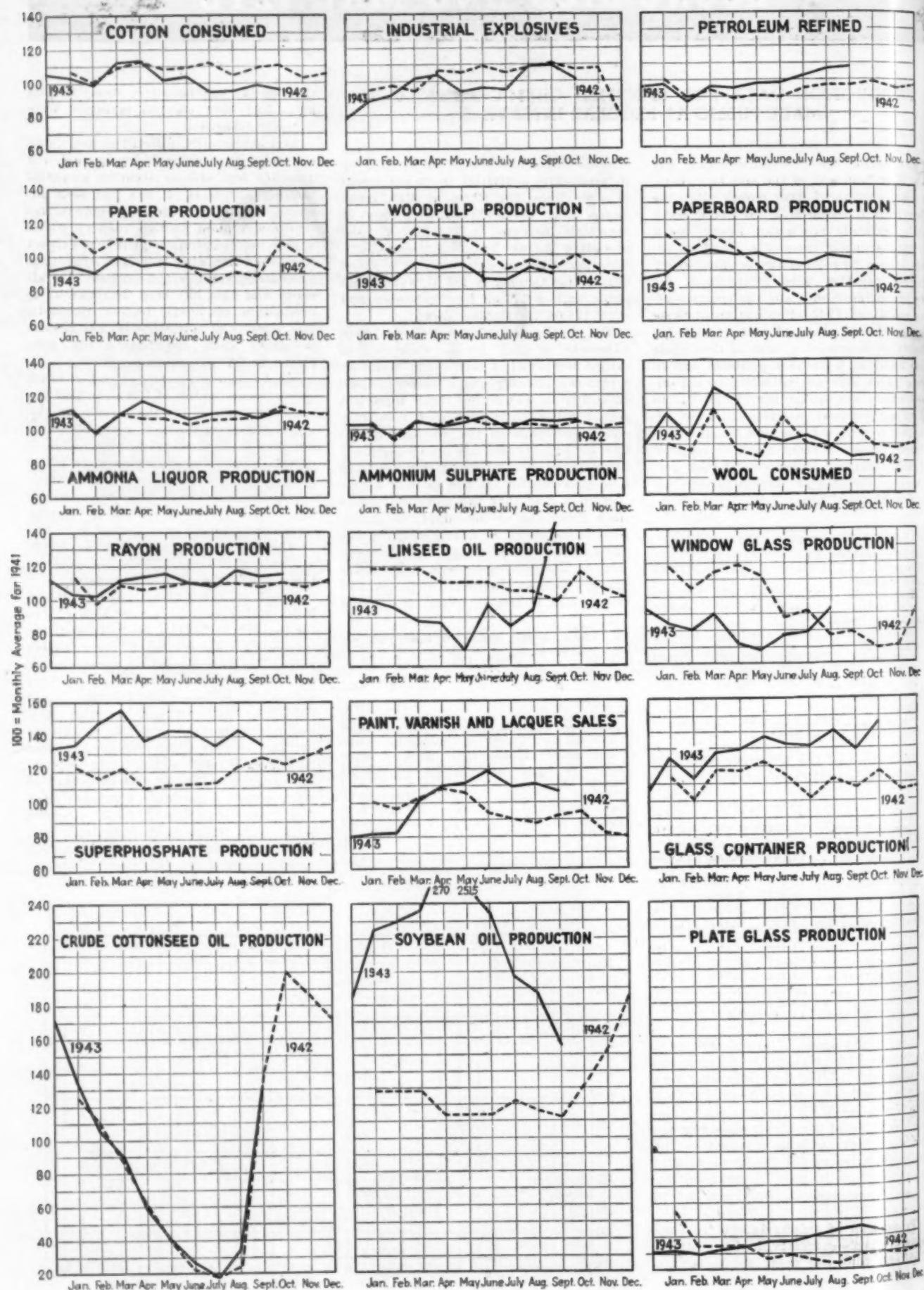
At leather mills, difficulties are found not only in securing hides in sufficient quantity but also is securing essential tanning materials. It has just been announced that an Argentine concern has acquired a plant in this country which will be used to produce quebracho extract from bark imported from the Argentine. Chestnut extract is not available for all needs and this has been detrimental to production of heavy leather products. The scarcity of this material has become so grave that distribution has been placed under government control.

The food program has placed so much stress upon supplies of fertilizer that the seasonal trends in that industry no longer exist and there is a semblance of regularity in monthly outputs. This is especially true for superphosphate which must be turned out in record amounts if requirements are to be met. Some trouble has been experienced of late in keeping fertilizer materials on a desired level and as the future program calls for larger amounts, the necessity for stepping up the raw material supply is apparent.

Based on the Federal Reserve Board index which reached a new high of 245 for October, industrial production still is increasing although at a much slower rate. The Department of Commerce is the authority for the statement that among the factors retarding the rise of industrial production, material and equipment shortages are still prominent but lack of manpower remains the chief bottleneck directly or indirectly underlying the others. The number of industrial areas where acute labor shortages exist rose from 71 on Oct. 1 to 77 a month later. This means that acute labor conditions are found in 22 percent of the 351 areas classified by the War Manpower Commission.



Production and Consumption Trends



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CHEMIC

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As a large producer of magnesium sheet and strip, and in view of the expanding usefulness and applicability of this wondrously light metal, Revere will now be able to serve American industry in many fields, from aviation to railroads.

Some typical uses in addition to transportation: various small mechanical parts; reciprocating elements in textile machinery; works of calculating machines; housing for portable machinery; typewriter frameworks—the possibilities are almost endless it would seem. As developments ensue, Revere will be ready to supply requirements and offer appropriate technical advice.

The new Research and Development Department of the Magnesium-Aluminum Division at Baltimore will be of material aid in working with Revere customers in the solution of any of their particular manufacturing problems.

Manufacturers who would know more of the possible adaptability of the various Revere magnesium alloys to their needs, are invited to write us, *without obligation*. Address all inquiries to: Revere Copper and Brass Incorporated, Magnesium-Aluminum Division, P. O. Box 2075, 1301 Wicomico Street, Baltimore 3, Maryland.

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BONDS AND PAVE THE
WAY TO VICTORY

BALTIMORE, October 1st — Revere Copper and Brass Incorporated announces its entrance into magnesium production. It will soon begin operating the largest magnesium sheet and strip rolling mill in the world.

It is indeed significant that Revere—the oldest name in the entire non-ferrous industry—now becomes associated on a large, important scale with the newest metallic material whose almost magical lightness and versatility predestine it to an epoch-making future.

It may be well said that the pioneering spirit of Paul Revere himself still carries on with all its trail-blazing fame.

The Company is planning a limited production for the immediate future, but will increase the quotas until the mill reaches its capacity in January, 1944.

Three Important Alloys Offered

Revere will make three most commonly-used sheet magnesium alloys.

Revere Magnesium "M" will be a magnesium-manganese alloy, possessing moderate strength with good forming characteristics.

Revere Magnesium "J-1" will also be offered. This is the highest strength sheet on the market, used principally by the airplane industry. This is a magnesium-aluminum-zinc alloy.

In addition, *Revere Magnesium "FS-1"*, a magnesium-aluminum-zinc alloy will be produced. This alloy will possess higher physical characteristics than "M", but lower than "J-1" and, combining with these improved strengths, it will also possess a good forming quality.

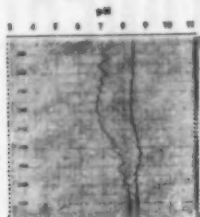
REVERE

COPPER AND BRASS INCORPORATED

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CONSUMERS OF CHEMICALS HAVE BEEN ACTIVE IN PLACING ORDERS FOR FUTURE DELIVERIES

CHIEF INTEREST in the market for chemicals has centered in contracts for forward deliveries. The contracting season has been featured by an absence of price competition but a large part of production has been sold ahead and the active demand for finished products together with relative scarcity of many chemicals has been a factor in stimulating consumers to protect their future production schedules. With many materials subject to distribution directives, rated orders naturally predominate in business actually placed.

The paint industry has made the request that the quota provisions now in effect on the movement of linseed oil be lifted. It is contended that the reasons for restricting deliveries of the oil no longer prevail since ample supplies of seed are in sight. The quota system in cutting down the amounts of oil to move out of crushing plants likewise tends to cut down crushing operations and thus becomes a price factor by increasing the unit cost. Incidentally it was announced that the House Ways and Means Committee at the close of last month had approved a measure to suspend for three months the import duty on linseed. This action was taken to relieve the shortage of livestock and poultry feed. Cottonseed also was included in this resolution. With the import duty on linseed waived it is to be expected that Argentine shippers will be called upon to move large amounts of the surplus in that country but the movement may be curtailed by the availability of tonnage.

Naval stores products which were going up in price a month ago did not continue in that direction and recently lost some of the ground gained. The statistical position has not improved to any extent and it is now reported that production of rosin and turpentine declined in the six-month period of the present season as compared with the like period in 1942. In the case of turpentine the output fell from 339,436 50-gal. bbl. in 1942 to 298,009 50-gal. bbl. in the present year. Rosin output in the first six months of the 1942 season amounted to 1,243,151 500-lb. bbl. while the corresponding output for this year was 1,055,141 500-lb. bbl. There was a sharp increase in the amount of turpentine consumed in chemicals in the April-Sept. period this year, the total being 57,670 bbl. against 33,570 bbl. in the same months of 1942. Furthermore the figure for this year does not include the 6,737 bbl. used in ester gums and synthetic resins which use was not reported separately in former releases but was included under chemicals.

Consumption of rosin in the paper trade increased this season to 233,450 bbl. from 176,198 bbl. reported for last season, this probably resulting from the scarcity of casein and other sizing materials. Rosin consumed in chemicals was 130,991 bbl. as against 114,017 a year ago and in ester gum and syn-

thetic resins, the amounts used were 81,860 bbl. and 73,536 bbl. for 1943 and 1942 respectively.

Other price changes during the month included an advance of 20c a ton which was permitted on phosphate rock produced in Tennessee. The higher price was granted because production costs had moved up as a result of higher wages which threatened the small profit margin which had existed. To assure continued production of pine tar oil and pine wood charcoal, OPA authorized producers to increase prices generally 2% a gal. for pine tar or pine tar oil and \$5 a ton for pine wood charcoal.

In view of the interest taken in the postwar position of synthetic and natural rubber, it is of interest to note that one producer of synthetic rubber has announced a price reduction amounting to approximately 10 percent on all its crude synthetic rubbers. The reduction is attributed to lower production costs as a result of increased production and greater operating efficiency.

Among the materials placed under allocation in the last month was metallic sodium which is essential in the war program. This material is used to a large extent in the manufacture of high-octane gasoline and in making plexiglass airplane noses. Expansion in the two principal consuming fields made it necessary to control distribution. It also is reported that steps have been taken to expand production of sodium by improvements to present facilities.

Distribution controls also were made effective in the case of chestnut extract which has not been reaching tanneries in normal volume. Production has dropped sharply because of wood shortages and manpower shortage in both processing plants and forests.

Allocations of fats and oils for December indicate a continuing trend toward greater freedom of action in the industry. With the possible exception of drying oils the outlook is for easier controls.

Under a new allocation policy all applicants for glycerine for the December period will receive up to 1150 pounds

CHEM. & MET.

Weighted Index of Prices for CHEMICALS

Base=100 for 1937

This month	100.00
Last month	100.00
December, 1942	100.00
December, 1941	100.00

Interest in prices is largely centered on quotations for contract business. The chemical products which are not under controls have fluctuated but little although turpentine and rosins have offered some exceptions in recent trading, with turpentine falling to hold the advance made a month ago.

regardless of the quantity used in 1940 the base period. This will apply to manufacturers of military and essential civilian products and the manufacturers of less essential products as well. Result will be to make increased supplies available to small users who previously could get only a fixed percentage of the quantity they had used in the base period.

ALCOHOL FROM MOLASSES

Many of the alcohol plants again are operating with molasses as a raw material but desire to hold outputs at a maximum has given official authorization to use small amounts of corn and grain sorghums for the production of industrial alcohol in December. WPB's Chemical Division, with concurrence of WFA, has instructed a number of processors that they may use in December up to 45 percent corn or grain sorghums, or mixtures, for the production of alcohol. Use of corn and grain sorghums for this purpose has been prohibited since August at the request of WFA. Wheat has been used almost entirely in the interim.

Limits on the use of corn and grain sorghums in December have been set by transportation difficulties and by the knowledge of the Alcohol Section of WPB of the operation of each processor, especially in the production of protein feed.

Increased production of industrial alcohol is expected from the limited supplies of corn now available, which will go to less than half of the nation's industrial alcohol processors. While both industrial alcohol and protein animal feed can be produced from wheat, the output of either is less than can be made from corn and grain sorghums.

While separate data for chemicals are not given, total export trade this year has been on an almost unbroken upward line and it is fair to assume that chemicals played a prominent part in the outward movement of commodities. This is a condition which should continue for some time to come, hence the importance of foreign buying and lendlease upon chemical production.

On the other hand it is noted that government expenditures for war and all other purposes reached its high point in the second quarter of this year and fell off materially in the third quarter. This may or may not mean that the peak has been reached.

CHEM. & MET.

Weighted Index of Prices for

OILS & FATS

Base=100 for 1937

This month	145.24
Last month	145.24
December, 1942	140.89
December, 1941	129.80

Larger seed supplies have aided linseed oil outputs and prices remain at the recently lowered level. In general prices for oils and fats are firm with distribution controls keeping down the amount of crude oils available, but more glycerine is being allocated monthly for use in civilian goods.

CORROSION RESISTING

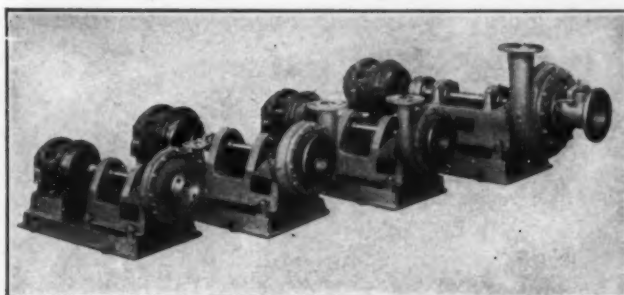


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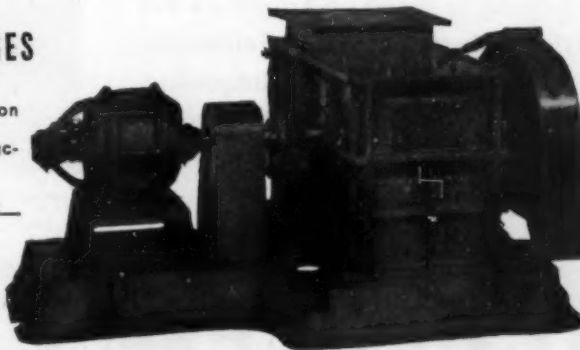
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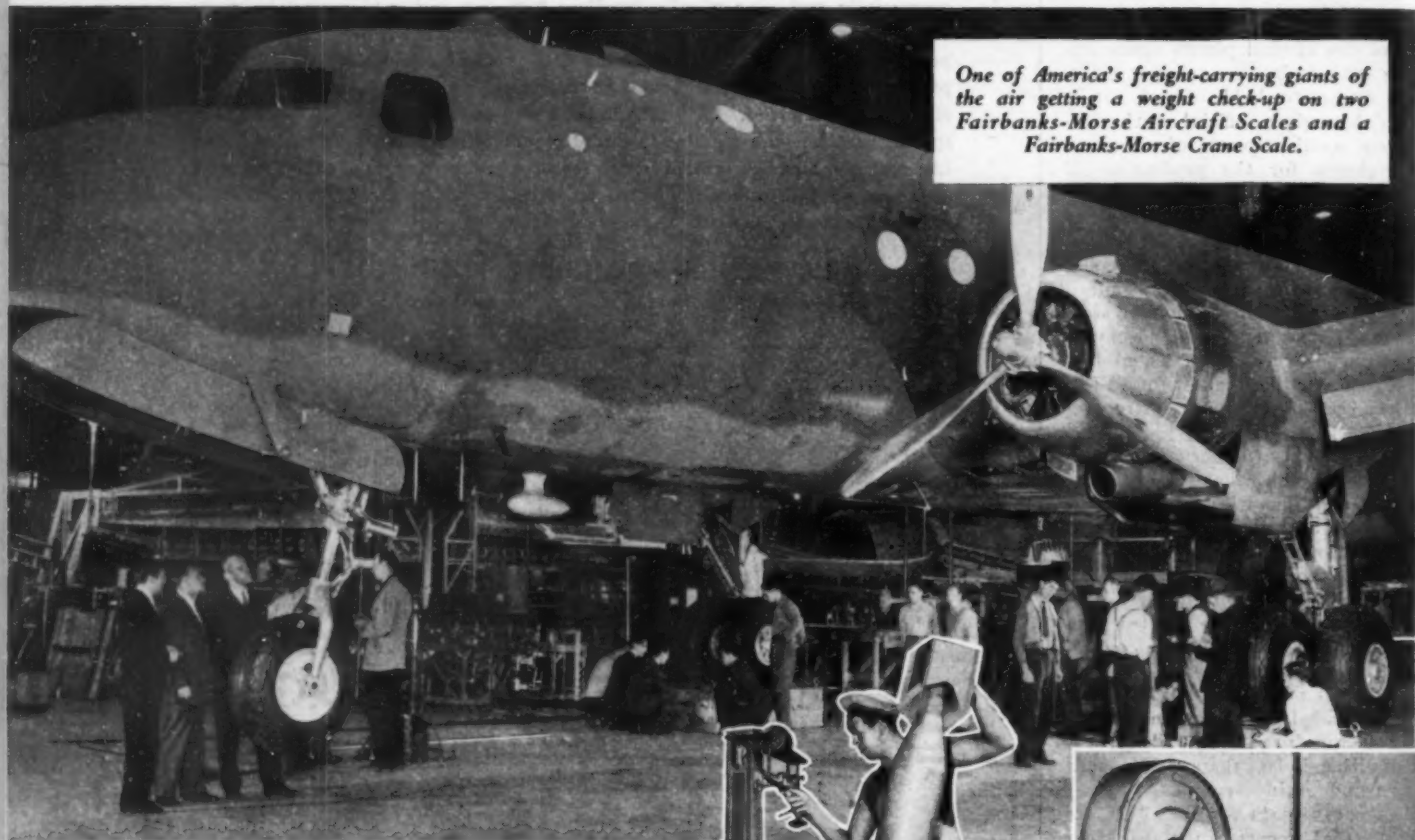
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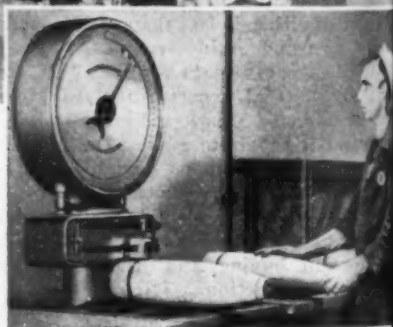


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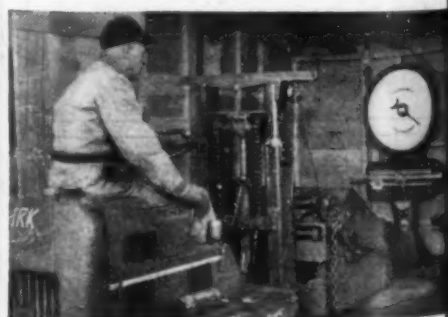
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Sulphur
Tannic
Tartar
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Phosph
Carbon
Tetra
Chlorine
Cylind
Cobalt o
Copper
Copper
Sulphur
Cream o
Diethyl
Epom s
Ethyl ac
Formal
Furfural
Fuel oil
Glauber
Glycerin

CURRENT PRICES

INDUSTRIAL CHEMICALS

	Current Price	Last Month	Last Year
Acetone, drums, lb.	\$0.085-\$0.109	\$0.085-\$0.109	\$0.85-\$0.109
Acid, acetic, 28%, bbl., cwt.	3.38-3.63	3.38-3.63	3.38-3.63
Glacial 99.5%, drums.	9.15-9.40	9.15-9.40	9.15-9.40
U. S. P. X 1, 99.5%, dr.	10.95-11.20	0.95-11.20	10.95-11.20
Boric, bbl., ton.	109.00-113.00	109.00-113.00	109.00-113.00
Citric, kegs, lb.	.20-.23	.20-.23	.20-.23
Formic, chys, lb.	.101-.11	.101-.11	.101-.11
Gallie, tech., bbl., lb.	1.10-1.15	1.10-1.15	1.10-1.15
Hydrofluoric 30% drums, lb.	.08-.084	.08-.084	.08-.084
Lactic, 44%, tech., light, bbl., lb.	.073-.075	.073-.075	.073-.075
Muriatic 18%, tanks, cwt.	1.05-. . .	1.05-. . .	1.05-. . .
Nitric, 36%, carboys, lb.	.05-.054	.05-.054	.05-.054
Oleum, tanks, wks. ton.	18.50-20.00	18.50-20.00	18.50-20.00
Oralic, crystals, bbl., lb.	.111-.13	.111-.13	.111-.13
Phosphoric, tech., c'bya, lb.	.071-.084	.071-.084	.071-.084
Sulphuric, 60%, tanks, ton.	13.00-. . .	13.00-. . .	13.00-. . .
Sulphuric, 66%, tanks, ton.	16.50-. . .	16.50-. . .	16.50-. . .
Tannic, tech., bbl., lb.	.71-.73	.71-.73	.71-.73
Tartaric, powd., bbl., lb.	.70-. . .	.70-. . .	.70-. . .
Tungstic, bbl., lb.	nom	nom	nom
Alcohol, amyl.	. . .	. . .	. . .
From Pentane, tanks, lb.	.131-. . .	.131-. . .	.131-. . .
Alcohol, Butyl, tanks, lb.	.101-.184	.101-.184	.121-. . .
Alcohol, Ethyl, 190 p/f, bbl., gal.	11.94-. . .	11.94-. . .	8.19-8.25
Denatured, 190 proof.	. . .	. . .	. . .
No. 1 special, dr., gal. wks.	.62-. . .	.62-. . .	.60-. . .
Alum, ammonia, lump, bbl., lb.	.031-.04	.031-.04	.031-.04
Potash, lump, bbl., lb.	.041-.044	.041-.044	.04-.044
Aluminum sulphate, com. bags.	. . .	. . .	. . .
Iron free, bg., cwt.	1.15-1.40	1.15-1.40	1.15-1.40
Iron free, bg., cwt.	2.35-2.50	2.35-2.50	1.85-2.10
Aqua ammonia, 26%, drums, lb.	.024-.03	.024-.03	.024-.03
tanks, lb.	.02-.024	.02-.024	.02-.024
Ammonia, anhydrous, cyl., lb.	.16-. . .	.16-. . .	.16-. . .
tanks, lb.	.041-. . .	.041-. . .	.041-. . .
Ammonium carbonate, powd., tech.	. . .	. . .	. . .
casks, lb.	.094-.12	.094-.12	.094-.12
Sulphate, wks. ton.	29.20-. . .	29.20-. . .	29.20-. . .
Amylacetate tech., from pentane,	. . .	. . .	. . .
tanks, lb.	.145-. . .	.145-. . .	.145-. . .
Antimony Oxide, bbl., lb.	.15-. . .	.15-. . .	.15-. . .
Arsenic, white, powd., bbl., lb.	.04-.044	.04-.044	.04-.044
Red, powd., kegs, lb.	nom	nom	nom
Barium carbonate, bbl., ton.	60.00-65.00	60.00-65.00	60.00-65.00
Chloride, bbl., ton.	79.00-81.00	79.00-81.00	79.00-81.00
Nitrate, casks, lb.	.11-.12	.11-.12	.11-.12
Blanc fix, dry, bbl., lb.	.031-.04	.031-.04	.031-.04
Bleaching powder, f.o.b., wks.	. . .	. . .	. . .
drums, cwt.	2.25-2.35	2.25-2.35	2.25-2.35
Borax, gran., bags, ton.	44.00-. . .	44.00-. . .	44.00-. . .
Bromine, cs., lb.	.30-.32	.30-.32	.30-.32
Calcium acetate, bags.	3.00-. . .	3.00-. . .	3.00-. . .
Arsenate, dr., lb.	.07-.08	.07-.08	.07-.08
Carbide drums, lb.	.044-.05	.044-.05	.044-.05
Chloride, fused, dr., del. ton.	18.00-24.00	18.00-24.00	18.00-24.00
flake, bags, del. ton.	18.50-25.00	18.50-25.00	18.50-25.00
Phosphate, bbl., lb.	.071-.08	.071-.08	.071-.08
Carbon bisulphide, drums, lb.	.054-. . .	.054-. . .	.054-. . .
Tetrachloride drums, gal.	.73-.80	.73-.80	.73-.80
Chlorine, liquid, tanks, wks., 100 lb.	2.00-. . .	2.00-. . .	2.00-. . .
Cylinders.	.054-.06	.054-.06	.054-.06
Cobalt oxide, cans, lb.	1.84-1.87	1.84-1.87	1.84-1.87
Copperas, bgs., f.o.b., wks., ton.	18.00-19.00	18.00-19.00	18.00-19.00
Copper carbonate, bbl., lb.	.194-.20	.194-.20	.18-.20
Sulphate, bbl., cwt.	5.00-5.50	5.00-5.50	5.15-5.40
Cream of tartar, bbl., lb.	.57-. . .	.57-. . .	.57-. . .
Diethylene glycol, dr., lb.	.14-.154	.14-.154	.14-.154
Epsom salt, dom., tech., bbl., cwt.	1.90-2.00	1.90-2.00	1.90-2.00
Ethyl acetate, drums, lb.	.124-. . .	.124-. . .	.12-. . .
Formaldehyde, 40%, bbl., lb.	.054-.06	.054-.064	.054-.06
Furfural, tanks, lb.	.09-. . .	.09-. . .	.09-. . .
Fusel oil, drums, lb.	.18-.19	.18-.19	.18-.19
Glauber salt, bags, cwt.	1.05-1.10	1.05-1.10	1.05-1.10
Glycerine, c.p., drums, extra, lb.	.184-. . .	.184-. . .	.184-. . .

INDUSTRIAL CHEMICALS

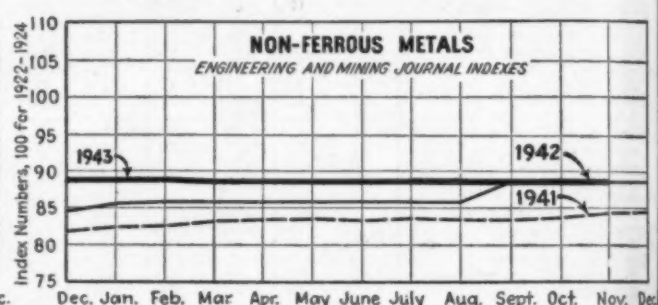
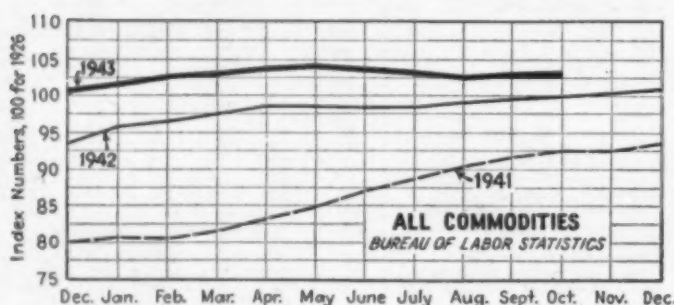
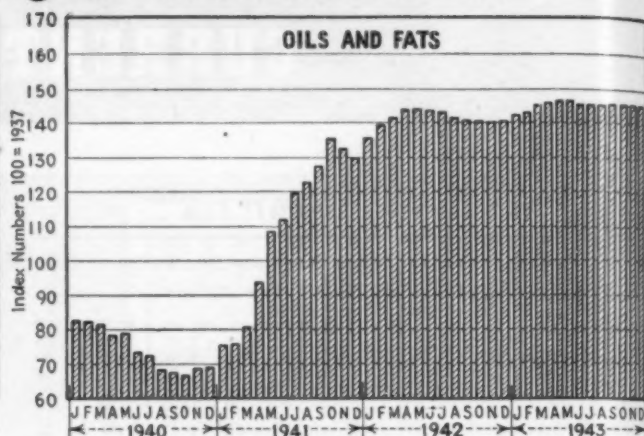
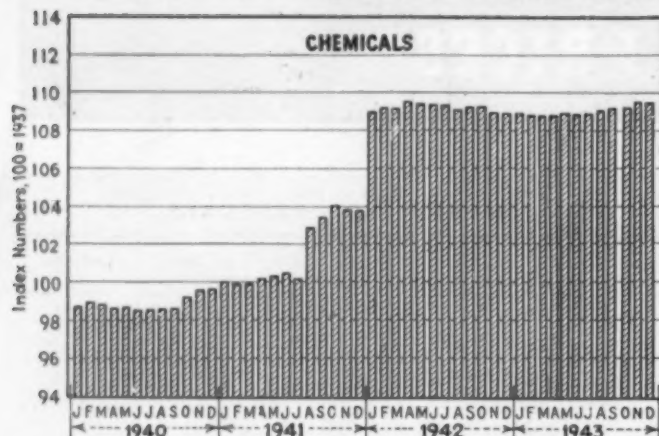
	Current Price	Last Month	Last Year
Lead:			
White, basic carbonate, dry	.084-. . .	.084-. . .	.084-. . .
casks, lb.	.074-. . .	.074-. . .	.074-. . .
White, basic sulphate, sk., lb.	.09-. . .	.09-. . .	.09-. . .
Red, dry, sk., lb.	.124-.13	.124-.13	.124-.13
Lead acetate, white crys., bbl., lb.	.114-.12	.114-.12	.11-.12
Lead arsenate, powd., bag, lb.	8.50-. . .	8.50-. . .	8.50-. . .
Lime, chem., bulk, ton.	.084-. . .	.084-. . .	.084-. . .
Litharge, powd., csk., lb.	.04-.044	.04-.044	.04-.044
Lithopone, bags, lb.	.064-.066	.064-.066	.064-.066
Magnesium carb., tech., bags, lb.	.58-. . .	.58-. . .	.60-. . .
Methanol, 95%, tanks, gal.	.58-. . .	.58-. . .	.60-. . .
97%, tanks, gal.	.28-. . .	.28-. . .	.28-. . .
Synthetic, tanks, gal.	.134-.134	.134-.134	.134-.134
Nickel salt, doub e, bbl., lb.	.124-. . .	.124-. . .	.124-. . .
Orange mineral, csk., lb.	.40-.42	.40-.42	.40-.42
Phosphorus, red, cases, lb.	.18-.25	.18-.25	.18-.25
Yellow, cases, lb.	.094-.10	.094-.10	.094-.10
Potassium bichromate, casks, lb.	.064-.07	.064-.07	.064-.07
Carbonate, 80-85%, calc. csk., lb.	.10-.12	.10-.12	.10-.12
Chlorate, powd., lb.	.07-.074	.07-.074	.07-.074
Hydroxide (c'stic potash) dr., lb.	.534-. . .	.534-. . .	.534-. . .
Muriate, 60% bags, unit.	.054-.06	.054-.06	.054-.06
Nitrate, bbl., lb.	.194-.20	.194-.20	.194-.20
Permanganate, drums, lb.	.17-.18	.17-.18	.17-.18
Prussiate, yellow, casks, lb.	.0515-.06	.0515-.06	.0515-.06
Sal ammoniac, white, casks, lb.	1.00-1.05	1.00-1.05	1.00-1.05
Salsoda, bbl., cwt.	17.00-. . .	17.00-. . .	17.00-. . .
Salt cake, bulk, ton.	. . .	. . .	. . .
Soda ash, light, 58%, bags, con-	1.05-. . .	1.05-. . .	1.05-. . .
tract, cwt.	1.15-. . .	1.15-. . .	1.15-. . .
Dense, bags, cwt.	. . .	. . .	. . .
Soda, caustic, 76% solid, drums,	2.30-3.00	2.30-3.00	2.30-3.00
cwt.	.05-.06	.05-.06	.05-.06
Acetate, del., bbl., lb.	1.70-2.00	1.70-2.00	1.70-2.00
Bicarbonate, bbl., cwt.	.074-.08	.074-.08	.074-.08
Bichromate, casks, lb.	16.00-17.00	16.00-17.00	16.00-17.00
Bisulphate, bulk, ton.	.03-.04	.03-.04	.03-.04
Bisulphite, bbl., lb.	.064-.064	.064-.064	.064-.064
Chlorate, kegs, lb.	.14-.15	.14-.15	.14-.15
Cyanide, cases, dom., lb.	.08-.09	.08-.09	.08-.09
Fluoride, bbl., lb.	2.40-2.50	2.40-2.50	2.40-2.50
Hyposulphite, bbl., cwt.	2.50-2.65	2.50-2.65	2.50-2.65
Metasilicate, bbl., cwt.	1.35-. . .	1.35-. . .	1.35-. . .
Nitrate, bulk, cwt.	.064-.07	.064-.07	.064-.07
Nitrite, casks, lb.	2.70-. . .	2.70-. . .	2.70-. . .
Phosphate, tribasic, bags, lb.	.104-.11	.104-.11	.104-.11
Prussiate, yel. drums, lb.	.80-.85	.80-.85	.80-.85
Silicate (40° dr.), wks., cwt.	.03-.034	.03-.034	.03-.034
Sulphide, fused, 60-62%, dr. lb.	.024-.024	.024-.024	.024-.024
Sulphite, crys., bbl., lb.	16.00-. . .	16.00-. . .	16.00-. . .
Sulphur, crude at mine, long ton.	.03-.04	.03-.04	.03-.04
Chloride, dr., lb.	.07-.08	.07-.08	.07-.08
Dioxide, cyl., lb.	1.90-2.40	1.90-2.40	1.90-2.40
Flour, bag, cwt.	.55-. . .	.55-. . .	.55-. . .
Tin Oxide, bbl., lb.	.394-. . .	.394-. . .	.394-. . .
Crystals, bbl., lb.	.054-.06	.054-.06	.054-.06
Zinc, chloride, gran., bbl., lb.	.14-.15	.14-.15	.14-.15
Carbonate, bbl., lb.	.33-.35	.33-.35	.33-.35
Cyanide, dr., lb.	.1035-. . .	.1035-. . .	.104-. . .
Dust, bbl., lb.	.074-. . .	.074-. . .	.074-. . .
Oxide, lead free, bag, lb.	.074-. . .	.074-. . .	.074-. . .
5% leaded, bags, lb.	3.85-4.00	3.85-4.00	3.85-4.00
Sulphate, bbl., cwt.	. . .	. . .	. . .

OILS AND FATS

	Current Price	Last Month	Last Year
Castor oil, No. 3 bbl., lb.	\$0.134-\$0.144	\$0.134-\$0.144	\$0.134-\$0.144
Chinawood oil, bbl., lb.	.38-. . .	.38-. . .	.38-. . .
Cocunut oil, Ceylon, tank, N. Y.,	nom	nom	nom
lb.	.124-. . .	.124-. . .	.124-. . .
Corn oil crude, tanks (f.o.b. mill),	. . .	. . .	. . .
lb.	.124-. . .	.124-. . .	.124-. . .
Cottonseed oil, crude (f.o.b. mill),	. . .	. . .	. . .
tanks, lb.	.151-. . .	.151-. . .	.151-. . .
Linseed oil, raw car lots, bbl., lb.	.09-. . .	.09-. . .	.09-. . .
Palm, casks, lb.	.13-. . .	.13-. . .	.13-. . .
Peanut oil, crude, tanks (mill), lb.	nom	nom	nom
Rapeseed oil, refined, bbl., lb.	.114-. . .	.114-. . .	.114-. . .
Soya bean, tank, lb.	nom	nom	nom
Sulphur (olive foots), bbl., lb.	nom	nom	nom
Cod, Newfoundland, bbl., gal.	nom	nom	nom
Menhaden, light pressed, dr., lb.	.1305-. . .	.1305-. . .	.117-. . .
Crude, tanks (f.o.b. factory) lb.	.089-. . .	.089-. . .	.088-. . .
Grease, yellow, loose, lb.	.084-. . .	.084-. . .	.084-. . .
Oleo stearine, lb.	.094-. . .	.094-. . .	.094-. . .
Oleo oil, No. 1	.11-. . .	.11-. . .	.11-. . .
Red oil, distilled, d.p. bbl., lb.	.114-. . .	.114-. . .	.114-. . .
Tallow extra, loose, lb.	.084-. . .	.084-. . .	.084-. . .

The accompanying prices refer to round lots in the New York market. Where it is the trade custom to sell f.o.b. works, quotations are given on that basis and are so designated. Prices are corrected to December 13

Chem. & Met.'s Weighted Price Indexes



Coal-Tar Products

	Current Price	Last Month	Last Year
Alpha-naphthol, crude bbl., lb....	\$0.52 - \$0.55	\$0.52 - \$0.55	\$0.52 - \$0.55
Alpha-naphthylamine, bbl., lb....	.32 - .34	.32 - .34	.32 - .34
Aniline oil, drums, extra, lb....	.15 - .16	.15 - .16	.15 - .16
Aniline, salts, bbl., lb....	.22 - .24	.22 - .24	.22 - .24
Benzaldehyde, U.S.P., dr., lb....	.85 - .95	.85 - .95	.85 - .95
Benzidine base, bbl., lb....	.70 - .75	.70 - .75	.70 - .75
Benzoic acid, U.S.P., kgs., lb....	.54 - .56	.54 - .56	.54 - .56
Benzyl chloride, tech., dr., lb....	.23 - .25	.23 - .25	.23 - .25
Benzol, 90%, tanks, works, gal....	.15 - .15	.15 - .15	.15 - .15
Beta-naphthol, tech., drums, lb....	.23 - .24	.23 - .24	.23 - .24
Cresol, U.S.P., dr., lb....	.11 - .11	.11 - .11	.11 - .11
Creosylic acid, dr., wks., gal....	.81 - .83	.81 - .83	.81 - .83
Diethylaniline, dr., lb....	.40 - .45	.40 - .45	.40 - .45
Dinitrophenol, bbl., lb....	.23 - .25	.23 - .25	.23 - .25
Dinitrotoluol, bbl., lb....	.18 - .19	.18 - .19	.18 - .19
Dip oil, 15%, dr., gal....	.23 - .25	.23 - .25	.23 - .25
Diphenylamine, dr. f.o.b. wks., lb....	.60 - .60	.60 - .60	.60 - .60
H-acid, bbl., lb....	.45 - .50	.45 - .50	.45 - .50
Naphthalene, flake, bbl., lb....	.07 - .07	.07 - .07	.07 - .07
Nitrobenzene, dr., lb....	.08 - .09	.08 - .09	.08 - .09
Para-nitraniline, bbl., lb....	.47 - .49	.47 - .49	.47 - .49
Phenol, U.S.P., drums, lb....	.10 - .11	.10 - .11	.13 - .13
Picric acid, bbl., lb....	.35 - .40	.35 - .40	.35 - .40
Pyridine, dr., gal....	1.70 - 1.80	1.70 - 1.80	1.70 - 1.80
Resorcinol, tech., kgs., lb....	.75 - .80	.75 - .80	.75 - .80
Salicylic acid, tech., bbl., lb....	.33 - .40	.33 - .40	.33 - .40
Solvent naphtha, w.w., tanks, gal....	.27 - .27	.27 - .27	.27 - .27
Tolidine, bbl., lb....	.86 - .88	.86 - .88	.86 - .88
Toluol, drums, works, gal....	.33 - .33	.33 - .33	.33 - .33
Xylol, com., tanks, gal....	.26 - .26	.26 - .26	.26 - .26

Miscellaneous

	Current Price	Last Month	Last Year
Barytes, grd., white, bbl., ton....	\$22.00 - \$25.00	\$22.00 - \$25.00	\$22.00 - \$25.00
Casein, tech., bbl., lb....	.21 - .24	.21 - .24	.19 - .20
China clay, dom., f.o.b. mine, ton....	8.00 - 20.00	8.00 - 20.00	8.00 - 20.00
Dry colors			
Carbon gas, black (wks.), lb....	.0335 - .30	.0335 - .30	.0335 - .30
Prussian blue, bbl., lb....	.36 - .37	.36 - .37	.36 - .37
Ultramarine blue, bbl., lb....	.11 - .26	.11 - .26	.11 - .26
Chromes green, bbl., lb....	.21 - .30	.21 - .30	.21 - .30
Carmine, red, tins, lb....	4.60 - 4.75	4.60 - 4.75	4.60 - 4.75
Para toner, lb....	.75 - .80	.75 - .80	.75 - .80
Vermilion, English, bbl., lb....	3.05 - 3.10	3.05 - 3.10	3.05 - 3.10
Chrome yellow, C.P., bbl., lb....	.14 - .15	.14 - .15	.14 - .15
Feldspar, No. 1 (f.o.b.N.C.), ton....	6.50 - 7.50	6.50 - 7.50	6.50 - 7.50
Graphite, Ceylon, lump, bbl., lb....	.08 - .10	.08 - .10	.08 - .10
Gum copal Congo, bags, lb....	.09 - .30	.09 - .30	.09 - .30
Manila, bags, lb....	.09 - .15	.09 - .14	.09 - .15
Demar, Batavia, cases, lb....	.10 - .22	.10 - .20	.10 - .22
Kauri, cases, lb....	.18 - .60	.17 - .60	.18 - .60
Kieselguhr (f.o.b. mines), ton....	7.00 - 40.00	7.00 - 40.00	7.00 - 40.00
Magnesite, calc, ton....	64.00 - .00	64.00 - .00	64.00 - .00
Pumice stone, lump, bbl., lb....	.05 - .07	.05 - .08	.05 - .07
Imported, casks, lb....	nom - .00	nom - .00	nom - .00
Rosin, H., 100 lb....	4.74 - .00	4.82 - .00	3.97 - .00
Turpentine, gal....	.85 - .00	.86 - .00	.69 - .00
Shellac, orange, fine, bags, lb....	.39 - .00	.39 - .00	.39 - .00
Bleached, bonedry, bags, lb....	.39 - .00	.39 - .00	.39 - .00
T. N. bags, lb....	.31 - .00	.31 - .00	.31 - .00
Soapstone (f.o.b. Vt.), bags, ton....	10.00 - 12.00	10.00 - 12.00	10.00 - 12.00
Talc, 200 mesh (f.o.b. Vt.), ton....	8.00 - 8.50	8.00 - 8.50	8.00 - 8.50
200 mesh (f.o.b. Ga.), ton....	6.00 - 8.00	6.00 - 8.00	6.00 - 8.00

INDUSTRIAL NOTES

DRAYER & HANSON, INC., Los Angeles, has appointed J. C. Lewis, Austin, Texas, as field representative in Arkansas, Louisiana, Texas, and Oklahoma.

STAYNEW FILTER CORP., Rochester, N. Y., has changed its name and is now known as Dollinger Corp. Lewis L. Dollinger is the president and founder of the company.

PRESSED STEEL TANK CO., Milwaukee, has appointed the Anchor Petroleum Co. as exclusive representative for the sale of Hackney cylinders in the Republic of Mexico.

THE COOPER-BESSEMER CORP., Mount Vernon, Ohio, has opened a third office on the Pacific Coast. It is in the Rust Bldg., San Francisco and is in charge of John G. McKisick.

THE CARBORUNDUM CO., Niagara Falls, has appointed E. R. Baxter assistant to Charles Knapp, vice-president in charge of sales. John F. Clayton has been made district sales

manager at Boston to succeed Fred W. Bonacker who was brought to the main office for special sales work.

DOW CHEMICAL CO., Midland, has placed Arthur Smith, Jr., in charge of magnesium sales in the southwest territory with headquarters in the St. Louis office.

HEAT TRANSFER PRODUCTS, INC., New York, is now represented in San Francisco by the Harry W. Parsons Engineering Co.

PHILADELPHIA QUARTZ CO., Philadelphia, has added Harold R. Hay to its sales development staff at the main offices.

MONSANTO CHEMICAL CO., St. Louis, has named J. Handy Wright as director of its department of industrial and public relations.

HERCULES POWDER CO., Wilmington, has named D. A. Bunce superintendent of its plant at Mansfield, Mass. H. R. Monfort,

chief chemist at Mansfield, will work with Mr. Bunce on production problems.

COCHRANE CORP., Philadelphia, announces that Joseph L. Dudley is now associated with the Cochrane Steam Specialty Co., Boston.

BLACKMER PUMP CO., Grand Rapids, has opened a new office in the Commercial Trust Bldg., Philadelphia, which is under the direction of B. Dunkley.

GUSTIN-BACON MFG. CO., Kansas City, Mo., has elected A. L. Gustin, Jr., as president to succeed his father recently deceased. J. F. Stephens has been made vice-president.

ROSS HEATER & MFG. CO., Buffalo, has opened a factory branch office in San Francisco. It is located in Central Tower and the manager is Richard N. Mathews.

DETREX CORP., Detroit, announces the appointment of W. F. Newbery as sales manager of the industrial division.

Acid-Proof In Any Form

AT ONE TIME or another, the Knight organization has made corrosion-proof Knight-Ware for practically every chemical purpose needing this type of equipment. Knight-Ware is made in one piece without seams or joints. Most of it has been especially made to meet customers' requirements.

In 37 years, Knight engineers and craftsmen have learned a lot on how to make acid-proof stoneware for the chemical process industries. Their experience and cooperation will help you solve your corrosion problems in the most practical, economical way.

MAURICE A. KNIGHT
112 Kelly Ave.
Akron 9, Ohio

Knight-Ware Tank

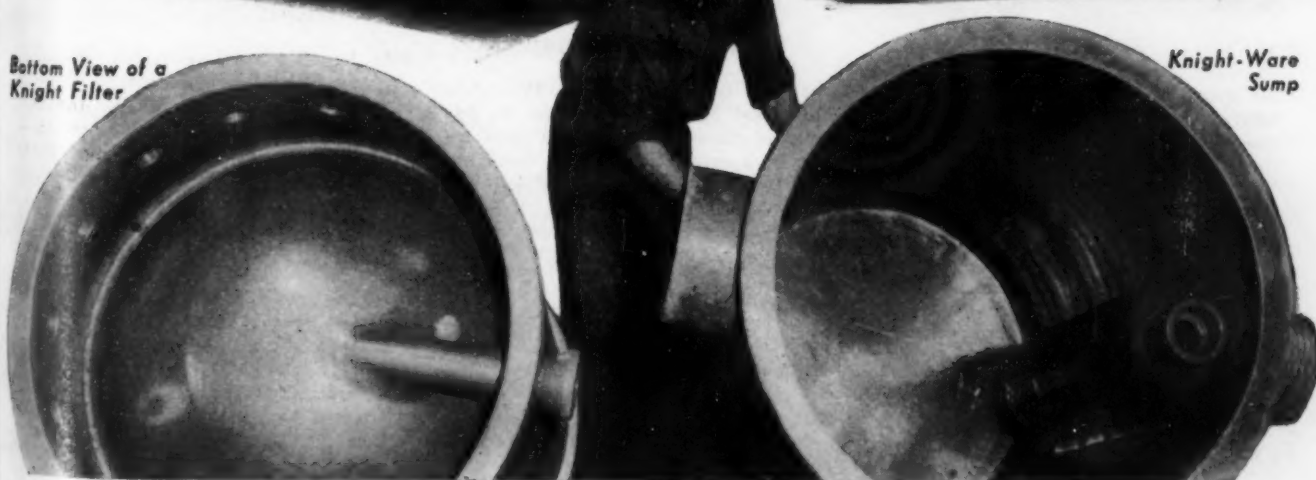
Knight-Ware Acid Cooler

KNIGHT-WARE
CHEMICAL EQUIPMENT



Bottom View of a Knight Filter

Knight-Ware Sump



NEW CONSTRUCTION

PROPOSED WORK

Calif., Los Angeles—B. F. Goodrich Co., 5400 East Olympic Blvd., plans to expand its tire and rubber products factory, including the construction of a carbon black plant. A. C. Martin, Higgins Blvd., Archt. Estimated cost will exceed \$40,000.

Conn., Norwalk—Norwalk Tire & Rubber Co., Winnipauk, Norwalk, plans the construction of a 2 story, 80x100 ft. factory. Fletcher-Thompson, Inc., 211 State St., Bridgeport, Engr. Estimated cost \$60,000.

Conn., West Haven—Armstrong Rubber Co., M. Snyder, 475 Elm St., West Haven, Conn., contemplates the construction of a factory. Fletcher-Thompson, Inc., 211 State St., Bridgeport, Engr. Estimated cost will exceed \$40,000.

Md., Elkton—Triumph Explosives, Elkton, plans the construction of additional buildings at its plant. Whitman, Requardt & Smith, 1304 St. Paul St., Baltimore, Engrs.

Mass., Springfield—Fisk Tire & Rubber Co., Division of U. S. Rubber Co., 154 Grove St., Chicopee Falls, is having plans prepared for the construction of a factory at Springfield. Estimated cost \$40,000.

Miss., Greenville—General Tire & Rubber Co., 1708 East Market St., Akron, O., plans to construct a plant for the manufacture of synthetic rubber tires. Estimated cost \$3,500,000.

Mo., St. Louis—Monsanto Chemical Co., 1700 South Second St., contemplates a post-war expansion program including conversion of 19 domestic plants, additional plant facilities, equipment, new plants, etc. Estimated cost \$50,000,000.

Nev., Mill City—Nevada-Massachusetts Co., Mill City, plans to rebuild its 250 ton gravity milling plant, one of the largest tungsten producers in the world, recently destroyed by fire. Estimated cost \$500,000.

O., Barberton—Seiberling Rubber Co., Barberton, plans to expand its plants here for the manufacture of synthetic tires and tubes. Albert Kahn & Associates, 345 New Center Bldg., Detroit, Mich., Archts. & Engrs. Project will be financed by Defense Plant Corp., Wash., D. C. Estimated cost \$1,500,000.

O., Cleveland—Warren Refining & Chemical Co., D. H. Gehhardt, Mgr., 1111

	Current Projects		Cumulative 1943	
	Proposed Work	Contracts	Proposed Work	Contracts
New England.....	\$140,000	\$45,000	\$475,000	\$1,122,000
Middle Atlantic.....	80,000	40,000	14,639,000	18,956,000
South.....	3,500,000	5,750,000	12,270,000	34,343,000
Middle West.....	1,600,000	950,000	11,795,000	16,565,000
West of Mississippi.....	4,540,000	4,000,000	27,240,000	33,823,000
Far West.....	540,000	.....	22,125,000	70,603,000
Canada.....	425,000	.....	11,786,000	2,554,000
Total.....	\$10,825,000	\$10,785,000	\$100,330,000	\$174,966,000

Terminal Tower, plans to rebuild its 3 story, 81x110 ft. factory recently destroyed by fire. Estimated cost \$100,000.

Pa., Schenley—Jos. S. Finch Co., Inc., Schenley, plans to construct a 2 story 58x65 ft. dryhouse and 1 story, 40x60 ft. boiler house at its distillery. Carl J. Kiefer, 26 East 6th St., Cincinnati, Engr.

Tex., Corpus Christi—Celanese Corp. of America, 180 Madison Ave., New York, N. Y., has purchased a site near here and plans to construct and equip a plastic and acetic acid manufacturing plant. Estimated cost \$4,500,000.

Tex., McGregor—Defense Plant Corp., 811 Vermont Ave., Wash., D. C., plans to convert a portion of existing Bluebonnet Ordnance Plant into a commercial fertilizer manufacturing plant.

Ont., Toronto—Duler Plastics, Ltd., c/o S. Cohen, 465 Bay St., Toronto, Ont., Can., plans the construction of a plant for the manufacture of plastics and plastic products. Estimated cost \$50,000.

Que., Drummondville—Canadian Celanese, Ltd., 1400 McGill College Ave., Montreal, Que., plans to enlarge its plant here. Estimated cost between \$350,000 and \$400,000.

CONTRACTS AWARDED

Alabama—Goodyear Tire & Rubber Co., 1144 East Market St., Akron, O., has awarded the contract for the construction of a synthetic rubber tire manufacturing plant, to Geo. A. Fuller Co., 111 West Washington St., Chicago, Ill. Project will be financed by Defense Plant Corp., Wash., D. C. Estimated cost \$3,000,000.

Ill., Cicero—American Phenolic Corp., 1830 South 54th Ave., has awarded the contract for the construction of an addition to its synthetic building to Campbell-Lowrie-Lautermilch Corp., 400 West Madison St., Chicago. Estimated cost \$60,000.

Me., Searsport—Summers Fertilizer Co., Stock Exchange Bldg., Baltimore, Md., has awarded the contract for the construction of a superphosphate plant to T. W. Cunningham, Inc., 15 State St., Bangor, Me. Estimated cost \$45,000.

Missouri—Defense Plant Corp., 811 Vermont Ave., N. W., Wash., D. C., has awarded the contract for design and construction of an alcohol plant to Sanderson & Porter, Engrs. & Bldrs., 1111 Rialto Bldg., Kansas City, National Distillers Products Corp., 120 Bway., New York, N. Y., will operate plant. Estimated cost \$4,000,000.

Ohio—Stauffer Chemical Co., 420 Lexington Ave., New York, N. Y., has awarded the contract for the construction of a plant to Brown & Matthews, Inc., 122 East 42nd St., New York. Estimated cost \$800,000.

O., Tiffin—Basic Refractories Corp., Tiffin, has awarded the contract for the construction of an addition to its plant to Mark Swisher, 1935 Euclid Ave., Cleveland.

O., Willoughby—Ohio Rubber Co., Ben Hur Ave., has awarded the contract for a 3 story, 51x80 ft. factory addition and a 1 story, 20x60 ft. refrigeration building to Gordon Rutland, 16 Brown St., Willoughby. Estimated cost \$50,000.

Pa., Logansport—Logansport Distilling Co., Logansport, has awarded the contract for alterations to its distillery and completion of boiler house to J. M. Baldwin, Whitfield Bldg., Pittsburgh. Estimated cost \$40,000.

Virginia—E. I. du Pont de Nemours & Co., du Pont Bldg., Wilmington, Del., has awarded the contract for expanding its cordura manufacturing facilities to Laburnum Construction Corp., Foushee and Franklin Sts., Richmond and Riggs. Distler & Co., Inc., 216 N. Calvert St., Baltimore, Md. Project will be financed by Defense Plant Corp., Wash., D. C. Estimated cost \$2,750,000.

1 Headache?...

Problems facing Processors today —

LAGGING SCHEDULES?



Maybe you have a bottleneck machine—an added machine could load up other units.

5 WEAK-SISTER MACHINERY?



Much equipment that "got by" in peacetime needs too much maintenance today.

6 OVERWORKED ENGINEERS?



Outside engineering cooperation may be all that's needed to get you out of a hole.

ALLIS-CHALMERS!

Complete line" engineers . . . familiar with every step in the basic processes. They know how vital it is for various machines to team-up properly — and how to achieve that team-work!

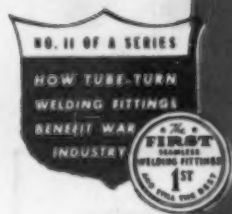
And they don't have to push any one type of equipment . . . because Allis-Chalmers builds *all* types of equipment . . . eight types of screen, for example, not just one or two types!

Result: Allis-Chalmers engineers have the same point of view as *your* engineers. Their objective is to give you precisely *the* right equipment for your particular needs!

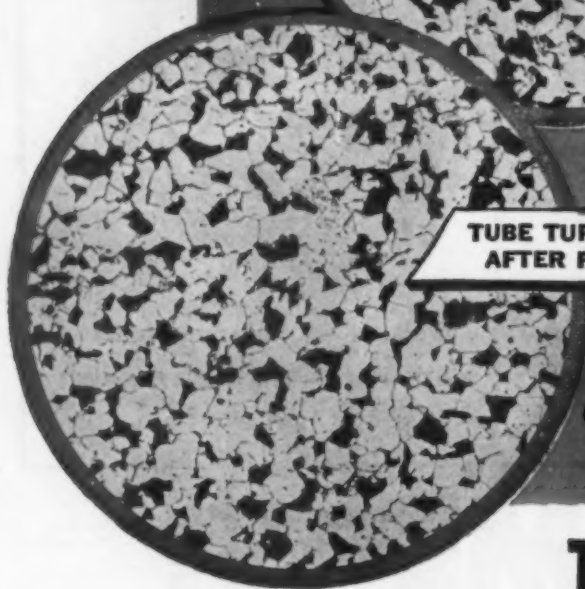
Whether you have a big or a small problem, Allis-Chalmers Cooperative Engineering is yours for the asking — with no strings attached. Write, wire or 'phone your nearby Allis-Chalmers district office. Or write ALLIS-CHALMERS MFG. CO., MILWAUKEE, WIS. A 1561



WASHING	PYRO-PROCESSING	DRYING	MILLING	SIFTING
Mill type washers — line of washing screens.	Multiple & flat hearth furnaces—rotary calcining kilns.	Rotary & hearth furnace dryers — revolving steam-tube dryers.	Milling & oil-extraction of cereals — chemical reduction.	Gyratory sifters & sifting reels for cereals, minerals, chemicals.



**TUBE TURNS STEEL
BEFORE FORGING**



**TUBE TURNS STEEL
AFTER FORGING**



EXTRA STRENGTH
of



Tube-Turn Welding Fittings prolongs piping service under wartime demands!

URGENT three-shift war plant schedules demand uninterrupted piping service—yet they impose triple duty on vital piping arteries. Fittings and joints bear the brunt of this wear and strain.

Tube Turns' exclusive manufacturing process actually improves on the top quality seamless steel tubing from which these fittings are forged. Proof lies in the 100X photomicrographs shown here. The finer grain quality in the Tube Turns metal structure guarantees the added strength

and greater resistance to wear and corrosion. Even *better* proof lies in the long, unfailing service Tube-Turn Welding Fittings are rendering in thousands of war plants today.

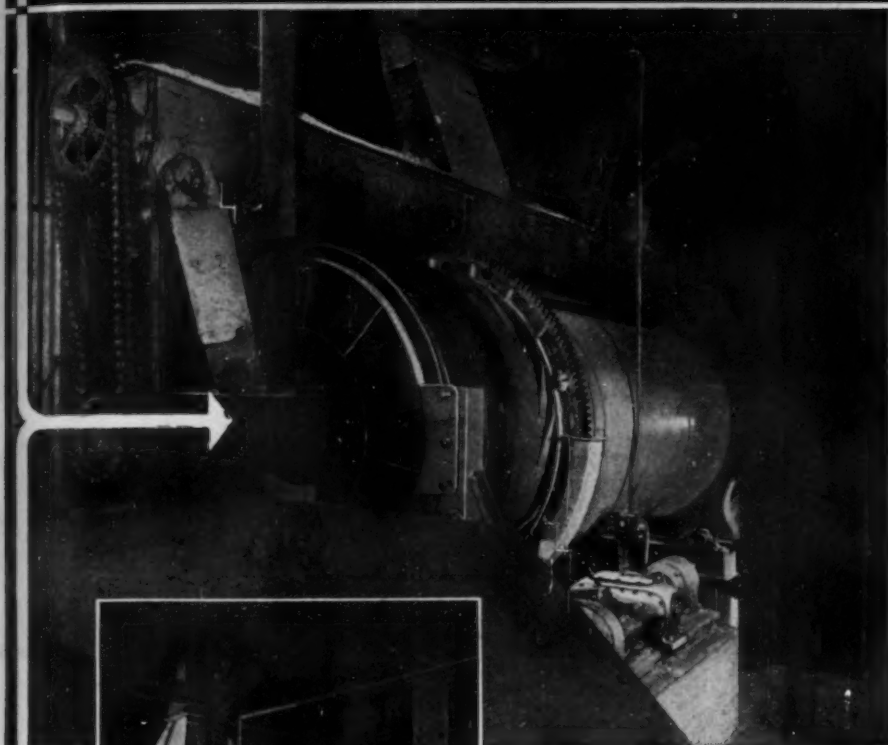
TUBE TURNS (Inc.) Louisville, Ky. Branch Offices: New York, Chicago, Philadelphia, Pittsburgh, Cleveland, Dayton, Washington, D. C., Houston, San Francisco, Seattle. . . . Distributors located in principal cities.

TUBE-TURN

Welding Fittings and Flanges

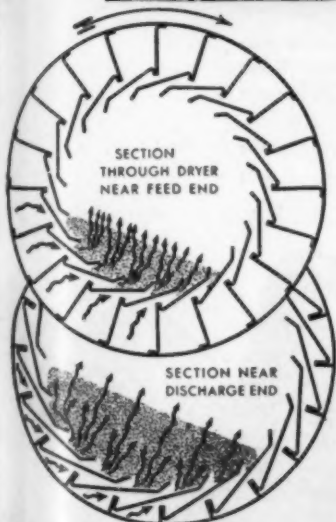


How a Vegetable Oil Producer Dehydrates Oil-containing Products



↑ General view of Link-Belt Roto-Louvre Dryer installation in plant of Vegetable Oil Products Co., Inc., Wilmington, Calif. Shows inlet end of dryer with screw conveyors for feeding the material into dryer drum; also illustrates in lower left corner a portion of gas-fired heater.

↑ Discharge end of Link-Belt Roto-Louvre Dryer. The dried products discharge to a short horizontal screw conveyor below floor level, feeding to the steel-encased bucket elevator seen at right. Bucket elevator discharges to screw conveyors which carry the material to a battery of oil expellers.



A large volume of dry hot air easily penetrates the relatively thin bed of material near the feed end of the dryer for maximum heat transfer where greatest evaporation can take place. As the material moves forward the bed becomes thicker and the air passages get smaller so that a reduced volume of heated air will penetrate the bed—thus preventing overheating.

● Copra, mustard seed, apricot kernels, and soy beans number among the oil-containing products being dehydrated at the Wilmington, Calif., plant of Vegetable Oil Products Co., Inc. By removing the excess moisture the following results are realized:

1. The extraction of oil is made easier.
2. A firmer meal of the residue is obtained.

The moisture in copra is reduced from 5.4% to 1.5%. 418 pounds of moisture is evaporated as 10,000 lbs. of the dehydrated product is discharged per hour. Copra is discharged from dryer at 140° F. with an exhaust air temperature of 160°.

The dryer handles between 45 and 50 tons of ground apricot kernels per 24-hour day. The moisture content is reduced from 7.6% to 4.6%. Inlet air temperature of 350° F. is used.

This efficient dryer operates on the convection principle of heat transfer. Materials are protected from over-heating and breakage. There are no "spotty" results—every particle of material is uniformly treated. Book No. 1911 tells how drying problems are solved. Send for it.

9226

LINK-BELT COMPANY

Chicago 9, Indianapolis 6, Philadelphia 40, Atlanta, Dallas 1, Minneapolis 5, San Francisco 24, Toronto 8. Offices, warehouses and distributors in principal cities.

LINK-BELT
ROTO-LOUVRE HEAT DRYER





120,000 *cookies per hour* ON **SKF** BEARINGS

Baking is a war job that spells **BIG** in capital letters... and like most big jobs depends upon the collective performance of many little things such as bearings. On the Reeves variable speed drives and other important locations of these two 224' long baking ovens, for instance, are **SKF** Bearings. That means smooth, continuous operation while the band oven (left) produces up to 120,000 cookies per hour and the plate oven (right) turns out 3000 lbs. of baked crackers per hour. It means accurate bearings that easily absorb radial and thrust loads... that stick to the job. On an oven, the same thing is true as on any machine, the better the performance of its bearings, the better its performance.

5421

SKF INDUSTRIES, INC., FRONT ST. & ERIE AVE., PHILA., PA.



This **BIRD** is Doing a Job

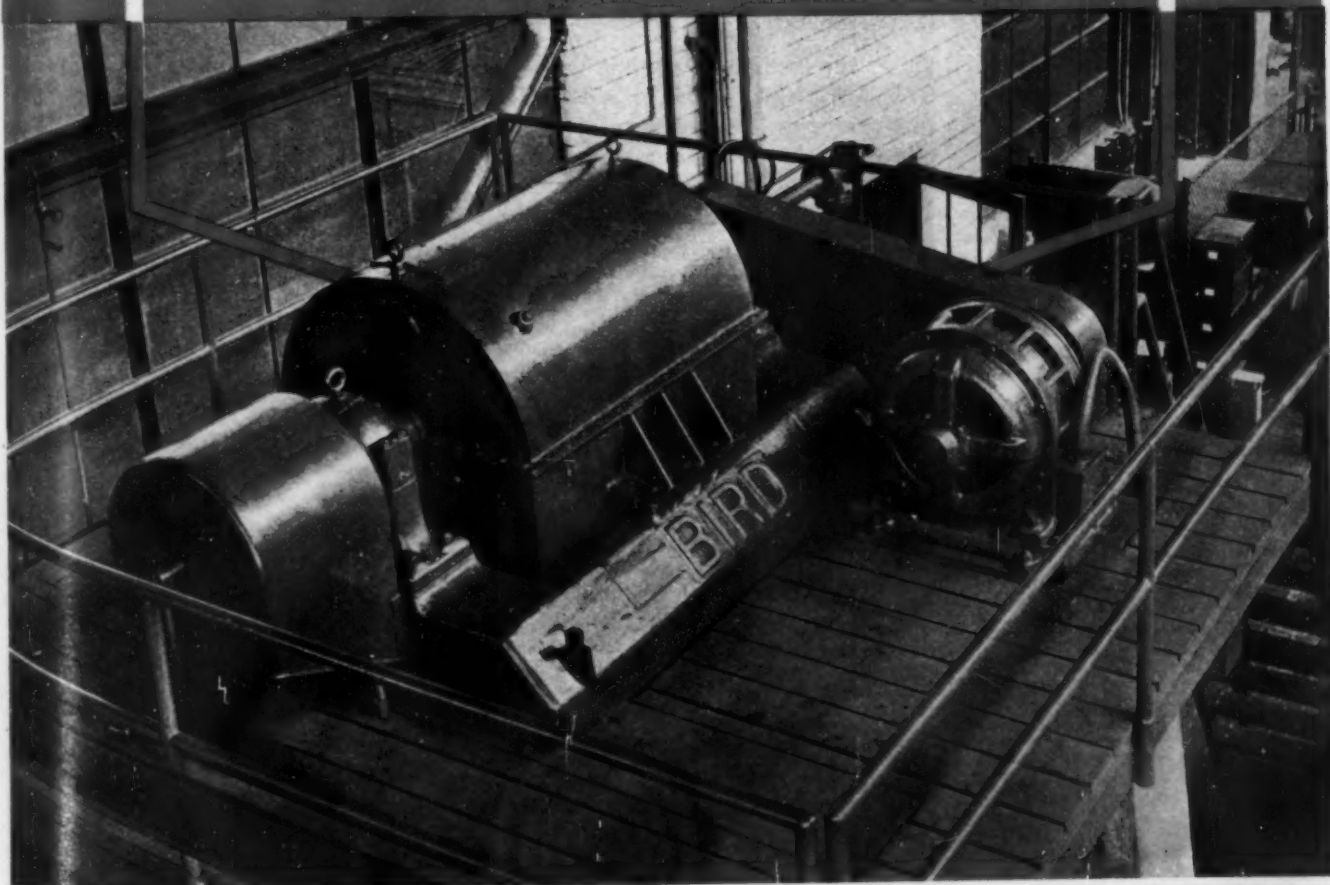
Like dozens of other BIRD Filters in war production work all over this continent, *this* BIRD is doing a job of continuous separation of solids from slurries by *centrifugal sedimentation*.

Tucked away out of sight and out of mind, this compact, dependable unit takes virtually any filtration job in stride. It comes in five sizes, taking care of any production up to a ton of solids a minute. The solids can be as fine as face powder or as coarse as rock salt. The feed slurry can be thick or thin, hot or cold.

The Bird Filter is doing many regular filtering jobs better, faster and cheaper than ever before—and many a job that's too tough for ordinary filters to handle.

Now would be an excellent time to find out how it might fit into your postwar production scheme. Say the word and we'll give you the whole story.

BIRD MACHINE COMPANY
South Walpole • Massachusetts





Available in sizes 1/4" to 2".
Each size with expanded outlet
if desired.

Why the CASH STANDARD Streamlined PRESSURE REDUCING VALVE TYPE 1000

.... DOESN'T BECOME
GUMMED UP FROM
DIRT-SCALE AND
VISCIOUS MATTER..

● There are no complicated inside works in the "1000" valve. As a matter of fact there is only the one vital moving part—the seat piston. There are no restricted passages, no small ports, no aggregation of close fits. It's streamlined all of the way.

PERFORMANCE RESULTS FROM Streamlined Flow

1. Maximum Capacity when needed most
2. Accurate Pressure Control under toughest working conditions
3. Trouble-free Service
4. Smooth Operation
5. Tight Closure
6. Accurate Regulation
7. Speedier Production Results
8. Elimination of failures
9. Constant Delivery Pressure
10. Cost Saving Operation
11. No Spoilage
12. Practically zero in maintenance costs

Write for Bulletin "1000" which gives details on the performance of this "Streamlined" 1000 valve and its benefits.

The seat piston is opened in a positive manner by the force of the initial pressure and is closed in an equally positive manner by the force exerted by the delivery pressure on the diaphragm. The seat piston is tied to the diaphragm by the rocker arm so that when the diaphragm moves it must move too.

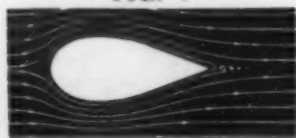
Thus, the positive moving valve arrangement in STREAMLINED housing, with its continuous-duty performance insures against trouble from gumming up, thereby minimizing maintenance.

How Streamline Design Works

● Flow has been streamlined for straight flow into the delivery passage and jet. See FIG. 1. The fluid

have downstream turbulence. See FIG. 2, the greatest amount of turbulence with resultant greatest pressure drop will occur when you want maximum flow and therefore want least pressure drop—if the delivery pressure is to be maintained. With

FIG.-1



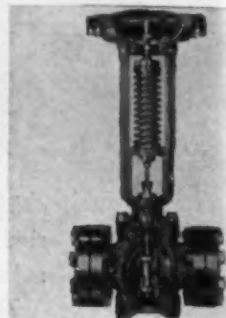
flows smoothly around this valve with no back eddies to cause turbulence. See FIG. 2, on the downstream side of its trailing edge. In a reducing valve all the pressure drop or work of pressure reduction should occur at one place, namely where the valve throttles flow, and not on the downstream side of the valve. Where you

FIG.-2

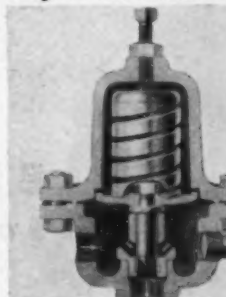


Streamlined Flow, See FIG. 1, you get maximum capacity, plus close delivery pressure control.

OTHER VALVES
from the
CASH STANDARD
LINE



Cash Standard Type 33 Relief Valve; in various metals to handle nearly all fluids. Has Roller guides on valve spindle; also roller bearing to take care of spring torsion. Sizes 1/2" to 3" screwed ends; 1" to 12" flanged ends. Bulletin 971.



Cash Standard Type Q Relief Valve has side inlet, bottom outlet. Popular for pump bypass use. Sizes 1/2" to 2" screwed ends. Relief pressures up to 350 lbs., temperatures up to 500°F. Bulletin 943.



Cash Standard Type 4190 Valve for relief (bypass) use; holds constant valve inlet pressure regardless of changes in load or outlet pressure. Multiport—large capacity. Iron or bronze bodies; iron or bronze trim. Sizes 1/2" to 2" screwed ends; 2" to 6" flanged ends. Bulletin 952.

CASH STANDARD
CONTROLS..
VALVES

A. W. CASH COMPANY
DECATUR, ILLINOIS

What's Your Pump I.Q.?



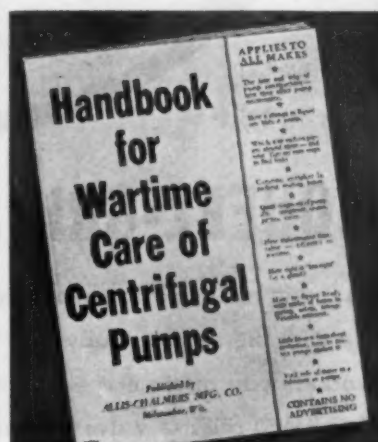
Suggestion — this new book is particularly helpful for training new men to make present pumps last. It applies to all makes — contains no advertising. When you *do* need new pumps, look into the extra efficiency, ruggedness and long life built into Allis-Chalmers centrifugal pumps... the famous "Electrifugal"... and all types for every purpose.

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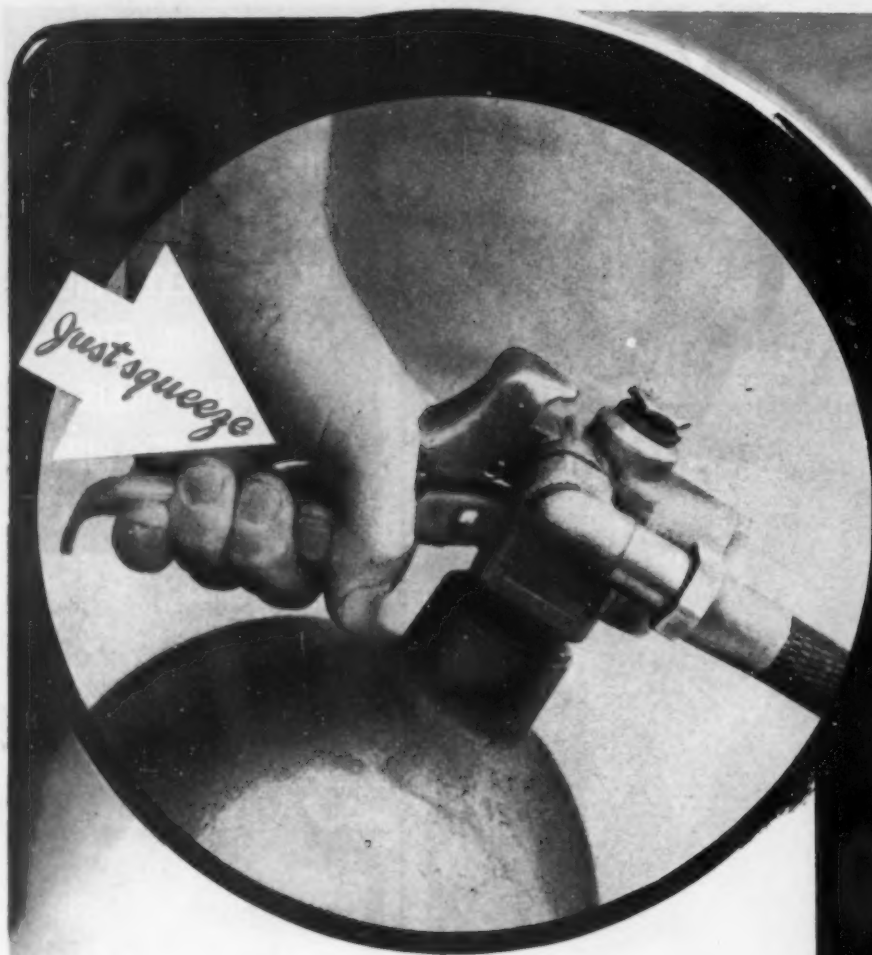
(Title)

(Company)

(Street Address)

(City and State)

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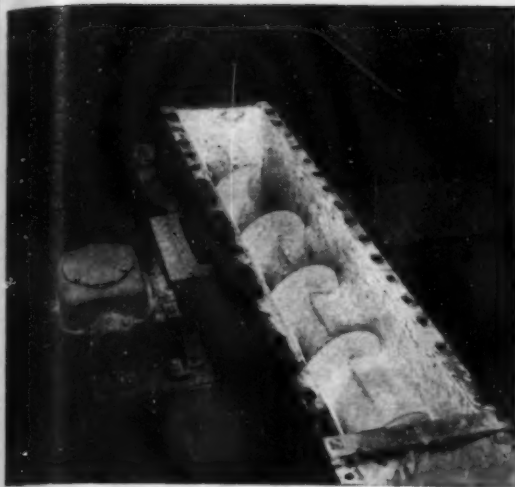
The swift release of carbon dioxide against sudden fires is so simple with the sensationally new SQUEEZ-GRIP valve that women workers can operate it easily and effectively. With this modern C-O-TWO release valve anyone using it merely closes his hand to operate the release lever, just above the carrying handle, and carbon dioxide, the fastest non-damaging fire extinguishing agent, knocks out a fire in split seconds. Even while carrying a 15 pound extinguisher—no need to set the cylinder down to operate it—C-O-TWO gas can be discharged or stopped as quickly as you can close or open your hand. Time is saved . . . gas is saved . . . property is saved. SQUEEZ-GRIP is Safer—It's Faster.



C-O-TWO FIRE EQUIPMENT COMPANY

NEWARK 1, NEW JERSEY

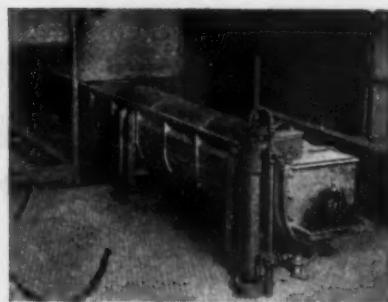
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AT THE SERVICE OF INDUSTRY —to Keep Production "On the Move!"

● Production methods in this war have developed a new functionary: the expediter—one who clips minutes, hours or days from production schedules by speeding the movement of materials and products into and out of plants. Within the plants, from stage to stage of production, from machine to machine, as well as outside, Link-Belt screw conveyors are nipping minutes from processes or intervals; costs tumble—hours are saved—wasted motions disappear.

Link-Belt experienced engineering . . . manufacturing ability . . . and facilities combine to give you a cooperative service that is outstanding in screw conveyor production. You can get any type of screw conveyor from Link-Belt. We service all users from stocks at plants, warehouses or distributors. Link-Belt makes everything for the complete conveyor installation. Specify genuine Link-Belt parts.

LINK-BELT MAINTENANCE PARTS SERVICE

Delivery of your maintenance parts may not always be prompt, so you had better play safe. Check your equipment now and place orders for parts likely to require early replacement as far in advance as possible.

LINK-BELT COMPANY

Engineers and Manufacturers of Materials Handling and Mechanical Power Transmission Machinery
Since 1875 Chicago, Indianapolis, Philadelphia, Atlanta, Dallas, Pittsburgh, Cleveland, Detroit, San Francisco, Toronto Offices, warehouses and distributors in principal cities.

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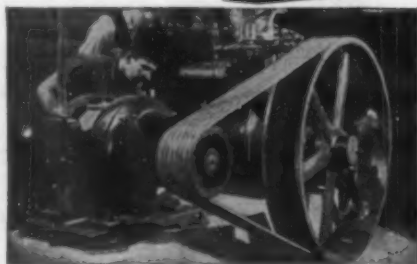
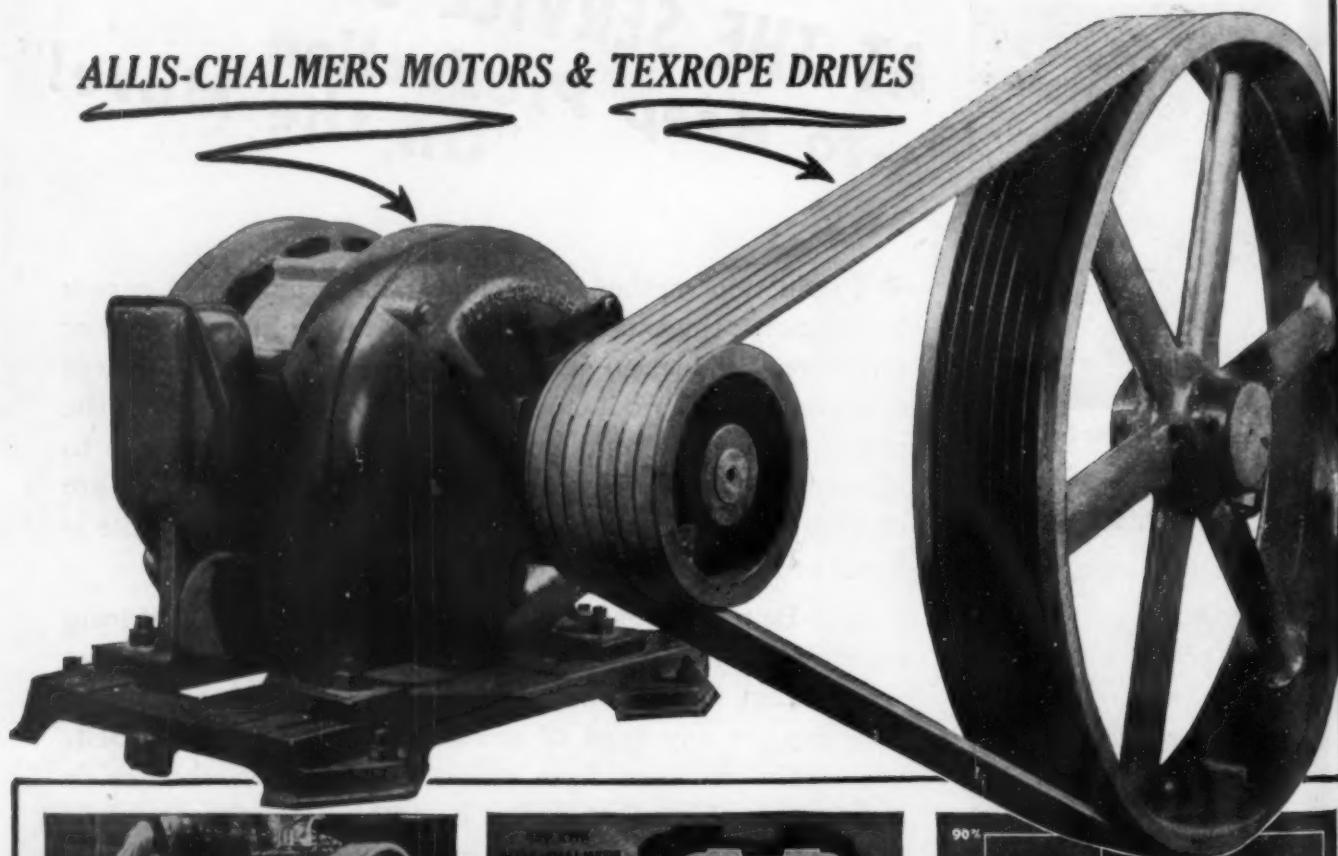
**COLLARS • COUPLINGS • HANGERS • TROUGHS •
BOX ENDS • FLANGES • THRUSTS • DRIVES**

Screw CONVEYORS



Here's the Team New Power

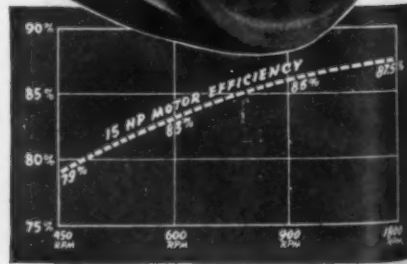
ALLIS-CHALMERS MOTORS & TEXROPE DRIVES



1 In most applications, an 1800 rpm motor with Texrope Drive will ably do the job of a lower-speed, direct-connected motor—at lower cost in money and materials!



2 When you buy an 1800 rpm instead of 450 rpm 15 hp squirrel-cage motor, for example, 600 lb are saved. And you save well over \$200—with drive figured in!



3 Note that efficiency rises from 79% for the 450 rpm motor to 87.5% for the 1800 rpm motor. The 1800 rpm motor saves you over 30 kw/24 hr. day.



WE WORK FOR
VICTORY

WE PLAN FOR
PEACE

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to Solve These Problems!

1. HOW TO DRIVE LOW SPEED MACHINERY WITH HIGH SPEED MOTORS? Allis-Chalmers Texrope Drives can "gear down" motor speeds over a range of 7 to 1. They're compact, highly efficient, protect your equipment by absorbing shock.

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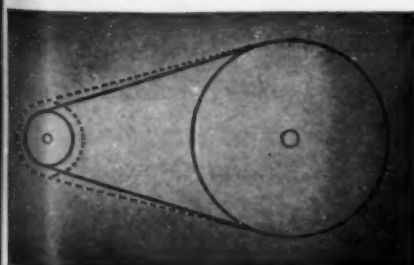
NOW THAT low-speed and multi-speed motors are sharply restricted, get the *flexibility* you need by teaming up available types of Allis-Chalmers Lo-Maintenance Motors with Texrope Drives.

As America's only builder of *both* motors and V-belt drives, Allis-Chalmers has long studied and

advocated their use in proper combination. Today, you benefit from Allis-Chalmers pioneering when you ask for—and get—the *right* combination of Lo-Maintenance Motor and Texrope Drive.

Call on any A-C district office or write to ALLIS-CHALMERS MFG. CO., MILWAUKEE 1, WIS.

A1647



4 Infrequently needed speed changes can be had by changing from one size motor sheave to another. Juggling *complete* drives, range is 1:1 to 7:1.



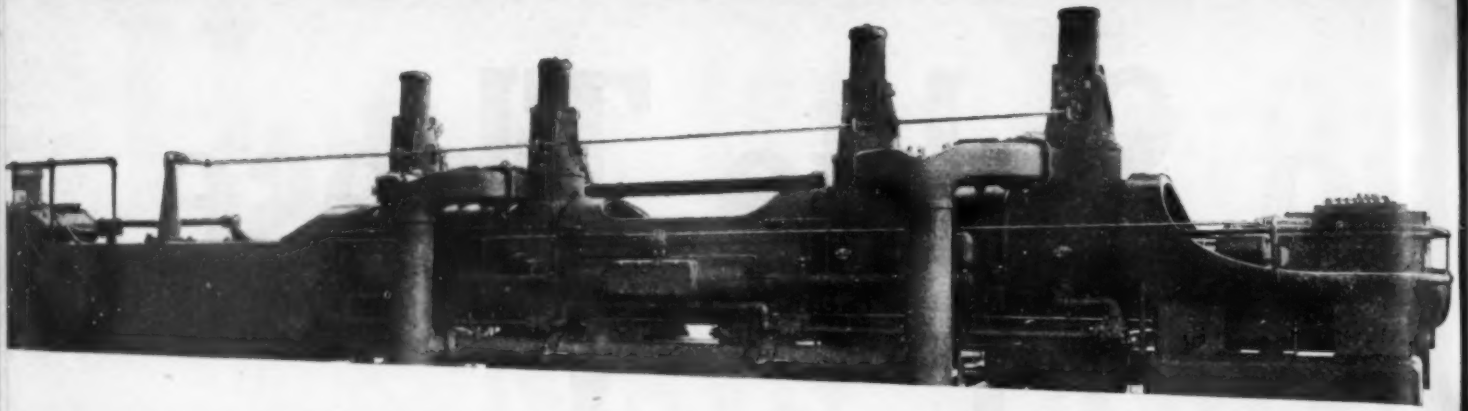
5 With the Allis-Chalmers Vari-Pitch Sheave, you can increase or decrease speed by adjusting sheave diameter . . . obtaining an *unbroken* series of speeds!



6 Allis-Chalmers Vari-Pitch Speed Changer gives you infinite changes at the turn of a wheel — within 3.75 to 1. It's compact, flexible, *efficient!*

ALLIS-CHALMERS

**LO-MAINTENANCE MOTORS
TEXROPE DRIVES**



NO PRIORITIES



ABOVE is represented the first gas-engine driven compressor sold by the C & G Cooper Company, predecessor of the Cooper-Bessemer Corporation. Installed in a West Virginia gas company pumping station in 1908 it is still on the job, performing faithfully.

THIRTY-FOUR years ago, Cooper gas engine driven compressors were serving the natural gas industry. They were helping to solve production and transportation problems which were just as difficult for the men of that day as are the problems of today.

All of those veteran Cooper engines are still in service, performing efficiently and economically. Their successors—the modern Cooper-Bessemer engines and compressors—incorporate the same rugged strength, high quality of materials and workmanship, soundness of design, and dependability of performance.

Cooper-Bessemer customers appreciate that there are no priorities on experience. The "Know How" of building good engines and compressors, of applying them correctly to your jobs . . . is *all* available to you now . . . to help you meet your wartime problems, just as freely as it was given in peacetime, just as it will be after Victory is won.

Cooper-Bessemer

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Houston, Dallas, Greggton, Pampa and Odessa, Texas Tulsa Shreveport St. Louis Los Angeles Seattle, Wash.

**TODAY THE MODERN G-MV COMPRESSOR IS
PREFERRED FOR:**

SYNTHETIC RUBBER

GAS REFORMING

***NATURAL GAS
TRANSMISSION***

SYNTHETIC

NATURAL GASOLINE

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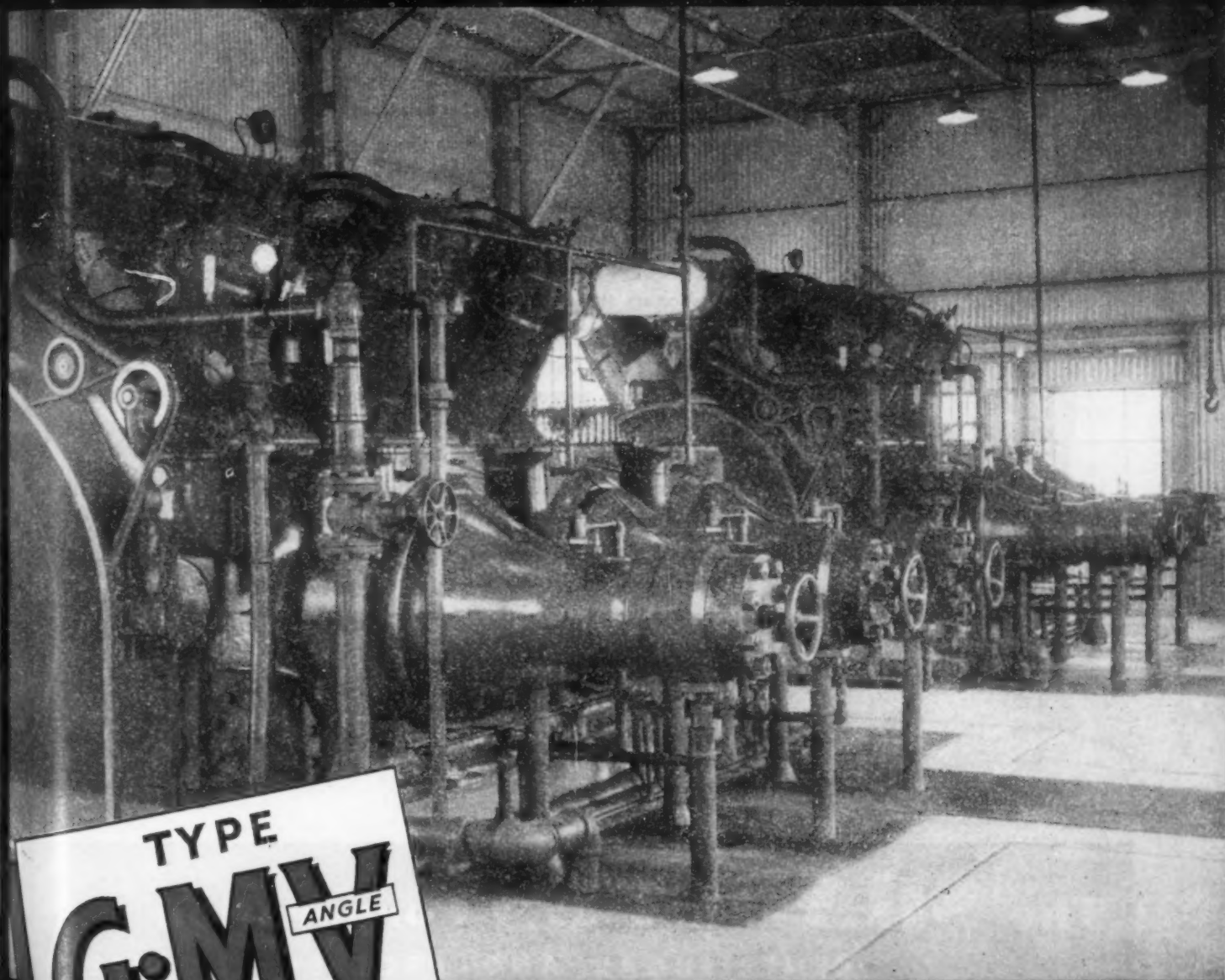
CYCLING

***COMPRESSING AIR
AND GASES FOR
OTHER VITAL WAR
INDUSTRIES***

HELIUM

REFINING

S ON EXPERIENCE



TYPE
G-MV
ANGLE

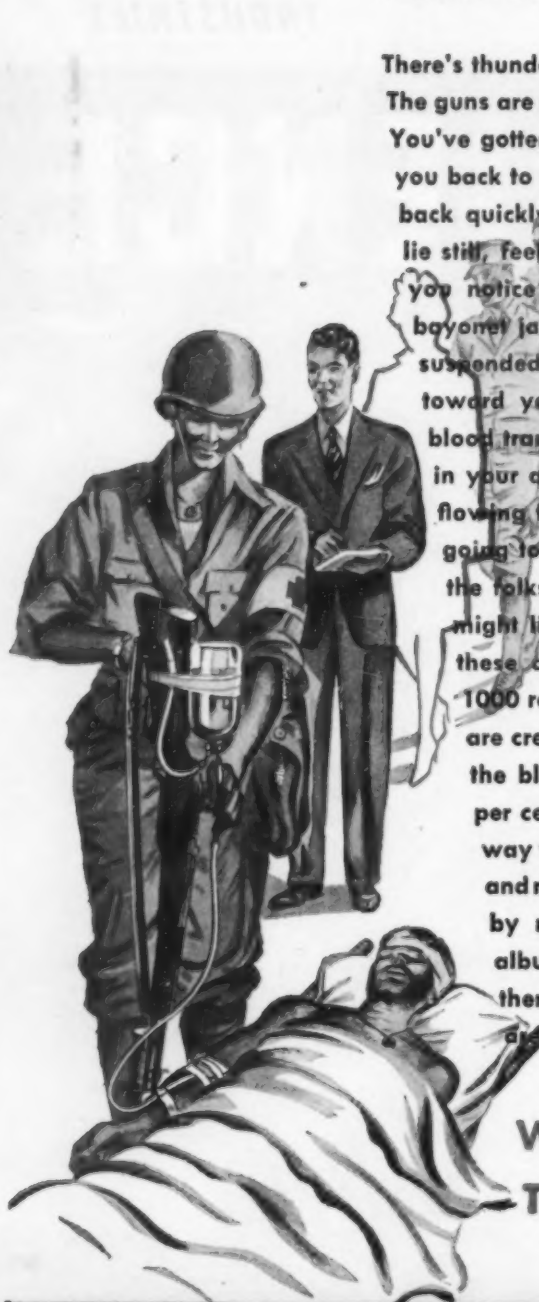
Compressor

New York Washington Bradford, Pa. Parkersburg, W. Va. Gloucester, Mass.

50

PHANTOM BLOOD DONORS

There's thunder up ahead and the ground is quaking. The guns are at it again. ★ ★ But you're out of it now. You've gotten yours so badly that they had to carry you back to an emergency station. They brought you back quickly, so maybe you've still a chance. You lie still, feeling your strength going fast. ★ ★ Dimly, you notice a rifle standing upright beside you, its bayonet jabbed deep into the earth. From its butt is suspended a bottle, and from that a rubber tube dips toward you. ★ ★ So they're going to give you a blood transfusion. ★ ★ You feel a pricking sensation in your arm, and you realize that life-giving fluid is flowing from that bottle into your veins. ★ ★ You're going to be saved! In your heart you give thanks to the folks back home who gave their blood that you might live. But what you don't know is that among these donors there can be 50 phantoms for every 1000 real donors. ★ ★ The 50 Phantom Blood Donors are created by a centrifugal machine which separates the blood into corpuscles and plasma. At least five per cent of the plasma separated in the conventional way was lost until The Sharples Corporation perfected and made available a Sharples Super-Centrifuge which, by recovering more plasma to be processed into albumin, creates, in effect, 1050 blood donors where there were only 1000 before. ★ ★ Now, gallant men are kept alive by precious plasma that used to be lost.



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SHARPLES



U.S.I. CHEMICAL NEWS

December



A Monthly Series for Chemists and Executives of the Solvents and Chemical Consuming Industries



1943

Diethyl Oxalate Supplements Scarce Lacquer Solvents

Reagent Uses Also Afford
Many Possibilities in Synthesis

Although in the past diethyl oxalate has found its greatest use in organic synthesis, it is today being employed in substantial quantities to replace and extend critically short nitrocellulose solvents.

Diethyl oxalate is an excellent solvent for nitrocellulose and has a slow evaporation rate. While its applications have previously been limited to specialized fields, due to its tendency to hydrolyze, it is now being used very successfully where special care is taken to eliminate all possible water from the formulation. It is recommended that wherever possible diluents with high aromatic content be used inasmuch as diethyl oxalate has a much higher dilution ratio with aromatic hydrocarbon diluents than it has with petroleum naphthas.

Diethyl oxalate offers many possibilities in chemical synthesis. Here are a few typical examples:

1. With ethyl acetate in the presence of sodium ethoxide (sodium ethylate) it yields ethyl sodium oxalacetate.
2. With acetone in the presence of sodium ethoxide, it yields xanthochelidonic acid ester (acetone dioxalic ester) from which the ethyl ester of chelidonic acid may be obtained. Gamma-pyrone may in turn be obtained from this latter substance.
3. With zinc and alkyl iodides, it gives ethyl esters of dialkylglycolic acid.
4. With sodium amalgam, the alcoholate of ethyl glyoxylate, ethyl oxomalonate, ethyl racemate, and the ethyl ester of dioxalic acid may be obtained. From this latter acid there may be obtained by reacting with phenylhydrazine, the phenylhydrazine of ethyl glyoxylate.
5. Electrolytic reduction gives ethyl glyoxylate.
6. With sodium ethoxide and urea, it gives parabanic acid (oxalylurea).
7. It is used to manufacture phenobarbital.
8. With ortho-nitrotoluene there results an alcohol condensation product containing a third group in the benzene ring.
9. By distilling with an alcohol other than ethanol the oxalic ester of the alcohol may be obtained through alcoholysis.

Patents New Protective Treatment for Textiles

A Canadian Patent has been granted covering the use of trichlorobenzyl phenyl ether dissolved in alcohol or acetone as a mothproofing agent for textiles. It is mixed with salicylanilide as a fungicide or with pyrethrum as an insecticide.

New Anti-Rust Compound Is Announced by U.S.I.

Extensive Use in Automotive and Industrial
Cooling Systems Seen for New Powder

Improved protection for radiators and other cooling-system surfaces is made possible by a new anti-rust compound in powder form, recently developed by U.S.I. Orange in color, the powder works equally well with water or any type of anti-freeze solution. Two ounces will protect a five-gallon capacity automobile cooling system.

Tests Possible Solvents For Tung Oil Extraction

Renewed interest in the possibility of increasing the yield of tung oil from domestic fruits is reflected in a recent study of solvents which might be used in an extraction process. Out of a total of 33 solvents studied, ethyl acetate and some 10 others held the most promise, from the standpoints of quality and yield of tung oil produced and from that of economics.

The study, carried on by three Department of Agriculture scientists, points out the necessity of selecting a solvent of sufficiently high boiling point to avoid excessive vapor losses, yet low enough to prevent deterioration of the tung oil quality through exposure to unduly high temperatures.

Alkyd Resin Can Replace Phenolics in Navy Primer

The Navy Department has announced that it will now accept, tentatively, a primer based on Holabird Specification ES-680a, Class 101 for use on all Naval equipment and machinery. This is covered by Specification 52-P-26 Primer, Metal (Brown) dated June 1, 1943, and will replace the original Zinc Chromate Primer 52-P-18 (phenolic) which will be used only for the painting of ships' hulls and com-

(Continued on next page)

Use of an inhibitor of this type in automobile cooling systems is particularly advisable this winter where anti-freeze solutions are being re-used, as the rust-inhibiting qualities originally present in the anti-freeze will have been lost.

Summer Use Important

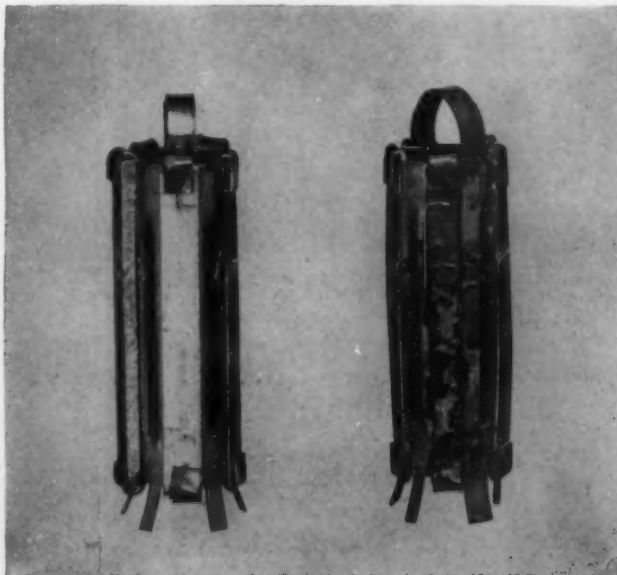
In addition to imparting anti-corrosive properties to alcohol or permanent type anti-freeze solutions, the compound is recommended for use for summer radiator protection. Recent reports by government agencies and automotive engineering groups indicate that radiator corrosion is at its peak during the summer, due to the higher temperatures and the fact that ordinary water is so generally used as a coolant.

Protects Many Metals

Extensive tests in U.S.I. laboratories have shown that the new inhibitor will protect surfaces of a wide range of metals, including aluminum, steel, cast iron, copper, brass and solder. By keeping heat transfer surfaces clean, the product helps assure efficient cooling, thus preventing engine overheating and loss of anti-freeze from boil-over.

U.S.I.'s new compound has no effect on rubber, and therefore cannot cause trouble with radiator hoses or other rubber appliances in the cooling system. It is also entirely odorless.

Unretouched photo of test bundles just as they appeared after an accelerated corrosion test simulating the most severe conditions encountered in automotive radiators. Bundles consist of strips of copper, aluminum, solder, brass, and cast iron, all crimped with good electrical contact to a steel frame. Note the corrosion and severe electrolysis which has taken place on the "control" bundle at right, which was exposed to untreated tap water. Note how clean and free from electrolysis the bundle at left is after exposure to similar tap water which had been protected with U.S.I.'s new anti-rust compound.



Resins in Navy Primer

(Continued from preceding page)

partments. Until such time as the Navy can evaluate submitted samples of Specification 52-P-26 and can establish an approved list, those products now having the approval of Holabird Quartermasters Depot will be accepted by them.

Specification 52-P-26 is met completely by Aroplaz 1323-D, a product of U.S.I.'s Stroock & Wittenberg Division, which is already being used extensively in Holabird Specification ES-680a. Although this is one of the lowest priced pure alkyl resins, it is a versatile high-quality product.

**Recovery of Free Acid
From Pickling Liquors**

Acetone has been found superior to solvents previously tried for promoting the crystallization of copperas from pickling liquor. While acetone is not satisfactory for the treatment of continuous-process liquor, batch liquor responds well from the standpoints of ferrous sulfate removal, acid concentration, quality of copperas, and acetone separation.

**Reports New Remedy
For Skin Ailments**

Tetraethylthiuram monosulfide is reported by a British Journal to have proved effective in the treatment of scabies. The liquid preparation used was an emulsifiable oil having the composition:

Tetraethylthiuram monosulfide	25%
Polyglycerol ricinoleate	10%
Industrial methylated alcohol	65%

One part of this oil was added to four parts of water immediately before use.

**Influence of Alcohols
On Indicators Described**

Color change of some titration indicators is reported to be markedly influenced by the lower alcohols.

The change is least pronounced with ethyl and *n*-propyl alcohol, more so with methyl, and most pronounced with iso-propyl alcohol. Impurities in the alcohol also have an appreciable effect, impossible values being obtained in the presence of ethers.

**Method for Determining
Chlorophyll and Carotene**

Of significance to the dehydrated food and other industries is a recently announced method of determining chlorophyll, pheophytin, xanthophyll and carotene—key factors in the taste and nutritional "goodness" of vegetables.

The method involves a combination chromatographic, solvents-partition, and spectrophotometric techniques. Pigment is first extracted with acetone, then transferred to ether and subjected to direct spectrophotometric analysis for chlorophyll and pheophytin. Xanthophyll and carotene are subsequently determined by chromatographic analysis.

Molasses Extender

Demand for Special Liquid Curbay as an extender for molasses in hog and dairy feed manufacture continues to grow. This U.S.I. product is also finding increased industrial use as a binder, and is said to offer interesting possibilities in the preparation of specialty agricultural products for plants and soils.

Special Liquid Curbay contains approximately 40-45% solids, can be handled just like molasses in storage or mixing equipment, and is available in tank car quantities without allocation limitations.

**Determination of Water
In High-Proof Ethanol**

A mixture of anhydrous ethanol and bicyclohexyl exhibits a critical solution temperature of 23.4°C.; with 1 per cent of water present, this temperature becomes 41.4°, and with 2 per cent water 54.1°. Thus the critical solution temperature can be plotted against the percentage of water present and the resulting curve used for determining the water content of high-proof alcohol.

The procedure recommended is to add 4.0 ml. of bicyclohexyl to 2.0 ml. of the alcohol to be tested and stir with a dry thermometer. Heat until the solution becomes clear and then cool slowly with stirring. Note the temperature at which the mixture becomes slightly opalescent.

TECHNICAL DEVELOPMENTS

Further information on these items may be obtained by writing to U.S.I.

Two new fatty acids, azelaic and pelargonic, described as straight chain acids containing nine carbon atoms are announced. Now in commercial production, these acids suggest new fields for investigation in textile applications, modifications of resins, plasticizers, etc. (No. 749)

A paint brush cleaner is offered which the maker claims will swell the bristles and loosen dried paint in 12 to 96 hours. The liquid is non-inflammable, non-fuming and harmless to the hands. It can be re-used after straining. (No. 750)

Low freezing points and mild odors are the featured points of a new series of plasticizers and softeners now being offered for use in coatings, adhesives, plastics, synthetic resins and rubbers, etc. A chart of the physical properties of these new products is available from the maker. (No. 751)

A quick-setting, tacky adhesive, developed primarily to cement cork inserts in reconditioned or new crows, is reported to work especially well in automatic cork inserting machines. The maker states the product is odorless and non-toxic. (No. 752)

Preventing electrolysis and consequent boiler corrosion is the purpose of a new galvanic cell designed to hang from a tube in the boiler. The cell, it is stated, concentrates electrolytic action at its negative pole, precipitating the mineral matter for removal during blowdown. (No. 753)

A new plasticizer, claimed to impart striking low temperature flexibility to synthetic rubber products, is being offered to processors of Butaprene, Chemigum, Hycar, Neoprene, Perbunan and Thiol. (No. 754)

A new floor cleaner, recommended also as an oil and grease absorbent for reducing fire and slipping hazards, is announced. Said to be non-abrasive, odorless, and non-injurious to skin, clothing or flooring, the product will absorb up to 50% of its weight of oil or grease. (No. 755)

Stable, uniform oil emulsions are said to be produced at higher speed with the aid of a new group of soluble resins. Sodium and potassium salts of selected resins, these resins are useful in the manufacture of cutting oils, polishes, paints, and many other products. (No. 756)

A new gas mask, approved for use in the presence of acid gases, organic vapors, ammonia, carbon monoxide and toxic smokes, where sufficient oxygen is present to support life, is announced. Shatter-proof lenses, an arrangement to prevent lens-fogging, and a dial which indicates safe remaining service time are incorporated in the design. (No. 757)

A new paint remover is reported to cut through the toughest film, leaving a clean, neutral surface that requires no after-washing or neutralizing. The product is said to be waxless, involve a minimum of fire and toxic hazards. (No. 758)

U.S.I. INDUSTRIAL CHEMICALS, INC.

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ALCOHOLS

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Butanol (Normal Butyl Alcohol)
Fusel Oil—Refined

Ethanol (Ethyl Alcohol)

Specially Denatured—all regular and anhydrous formulas
Completely Denatured—all regular and anhydrous formulas
Pure—190 proof, C.P. 96%, Absolute
Super Pyro Anti-freeze
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ANISOLS

Anisol M
Anisol PR

ACETIC ESTERS

Amyl Acetate
Butyl Acetate
Ethyl Acetate

OXALIC ESTERS

Dibutyl Oxalate
Diethyl Oxalate

PHTHALIC ESTERS

Diamyl Phthalate
Dibutyl Phthalate
Diethyl Phthalate

OTHER ESTERS

Diatol
Diethyl Carbonate
Ethyl Chloroformate
Ethyl Formate

INTERMEDIATES

Acetoacetanilide
Acetoacet-ortho-aniside
Acetoacet-ortho-chloranilide
Acetoacet-ortho-toluidide
Acetoacet-para-chloranilide
Ethyl Acetoacetate
Ethyl Benzoylacetate
Ethyl Sodium Oxalacetate

ETHERS

Ethyl Ether
Ethyl Ether Absolute—A.C.S.

RESINS

Natural
Synthetic

ACETONE

Chemically Pure

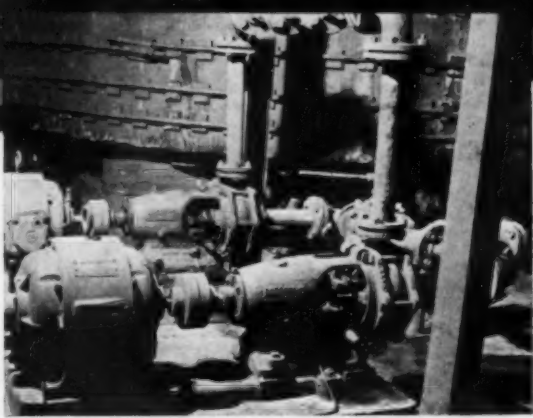
FEED CONCENTRATES

Curbay B-G
Curbay Special Liquid
Vacatone 40

OTHER PRODUCTS

Collodians
Ethylene
Ethylene Glycol
Indalone
Nitrocellulose Solutions
Urethan

Registered Trade Mark



These Durcopumps deliver 1½% sulfuric acid from wood tanks in background to coagulating tanks installed overhead.

HOW DURIRON HAS HELPED THE RUBBER INDUSTRY

These pictures of Duriron pumps were all taken in just one Goodyear synthetic rubber factory.

In the nation's new rubber industry there are more than 300 Duriron pumps, several thousand valves and jets, as well as long lines of Duriron pipe and fittings.

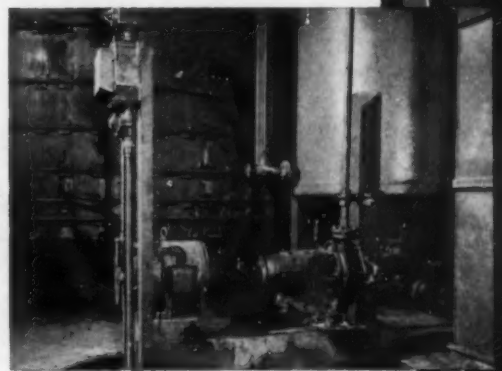
Duriron is a high silicon iron alloy and does not require nickel, chrome or other scarce metals.

These pictures are factual proof, therefore, of critical materials saved for the war without sacrificing the effectiveness of the important rubber development program.

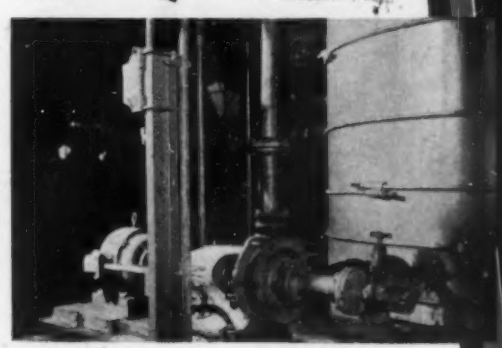
If you are wondering how to meet your corrosive problems, consider equipment built of corrosion-resistant Duriron.



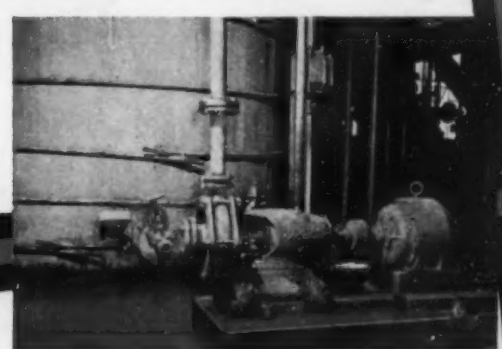
Two Durcopumps delivering dilute buffer solution from tanks in background to reaction tanks overhead.



This pump is transferring 66° Be sulfuric acid from the steel tank on right to the large wooden dilute acid tank on left.



This is the filter feed pump handling coagulated latex from holding tank on right to weir box which feeds rotary vacuum filter visible in the upper left corner.



Another filter feed pump installation handling coagulated latex to weir box.



THE DURIRON COMPANY, Inc.

DAYTON, OHIO, U. S. A.

STRATEGIC WAR MATERIALS

CONSUME **DIAMOND** PRODUCTS

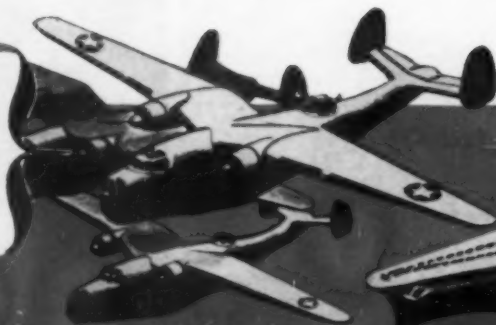
Clothing

To outfit our soldiers and sailors, millions of yards of wool and cotton are used. Diamond products are used in processing these materials as well as leather, rubber and metal items used for uniforms and equipment.



Aluminum

Many thousands of tons of Diamond Soda Ash are now being used in the manufacture of aluminum. The tremendous expansion of this demand has naturally caused shortages of Soda Ash for use elsewhere.



Explosives

Diamond Soda Ash and Caustic Soda enter into processes involved in the manufacture of TNT and nitro-glycerine, used for shells, bombs and explosives.

Rayon

Diamond Caustic Soda is consumed in large quantities for the manufacture of rayon, needed for many war services. Here again, the war demand gets the preference.

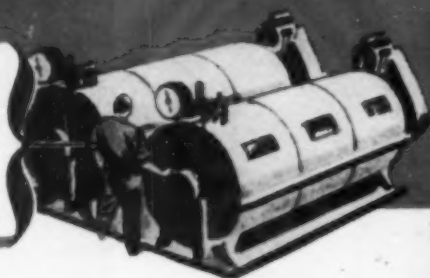
Dehydrated food

To meet increased demand for dehydrated foods, particularly for military needs, new manufacturing techniques have been developed. For example, in lye-peeling of vegetables and fruits, Diamond Research has helped perfect the process.



Cleansers

Prepared cleansers and synthetic solvents using Diamond Products are widely used in munitions plants, airplane factories, food processing establishments and other war production plants.



Shown here are a few of literally hundreds of applications of the Diamond Alkali Company's products now being used in war service. From the production of basic raw materials, to front line service, our products are helping the march to Victory!

This naturally means that civilian uses must wait until military and war production requirements are satisfied.

The same high quality and dependable uniformity that made Diamond Alkali products the first choice of experienced plant officials during peace times, now serve the operators of Uncle Sam's "Arsenal of Victory."

Medical supplies

The purity and dependability of many Diamond products is of great value where used for medical purposes. Bicarbonate of soda and Lysol Chlorine are two Diamond products used in the manufacture of medical aids.



DIAMOND ALKALI COMPANY

Pittsburgh, Pa., and Everywhere



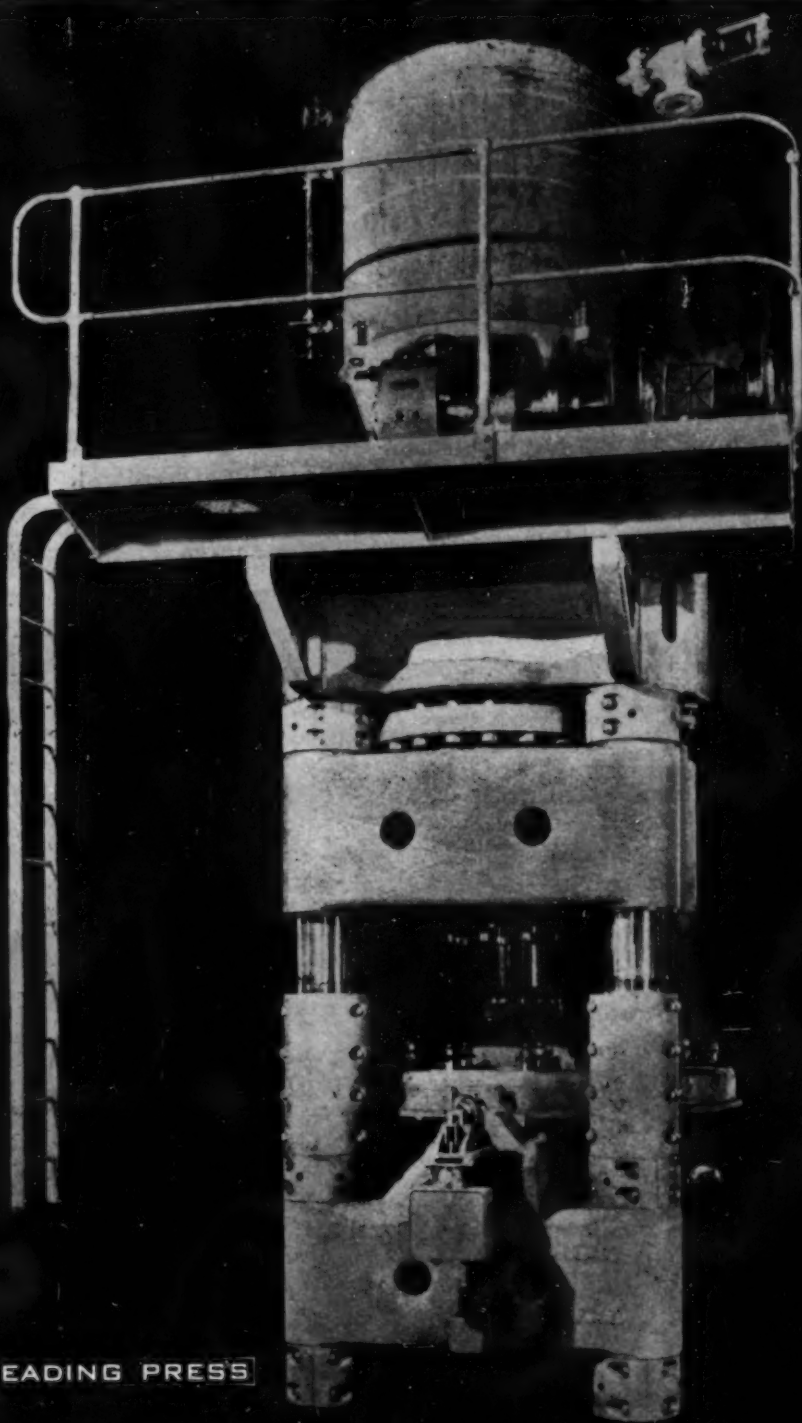
Armament

In the manufacture of armament, munitions and war materials, Diamond products are widely used—from steel making to cleaning finished parts.



Caustic
involved
T and
shells.

plies
stability of
is of great
medical pur-
poses and lig-
Diamond
manufacture



1300 TONS HEADING PRESS

HYDROPRESS · INC.

ENGINEERS

CONTRACTORS

HYDRAULIC PRESSES · ROLLING MILLS
PUMPS · ACCUMULATORS

570 LEXINGTON AVENUE · NEW YORK · N. Y.



Peace Work!

TODAY, each Sperry craftsman is doing his share of *peace work* . . . whether it's finishing filter plates or operating giant lathes. Each operation plays an important part in the production of a sturdy, efficient filter press that may help peace come a day earlier.

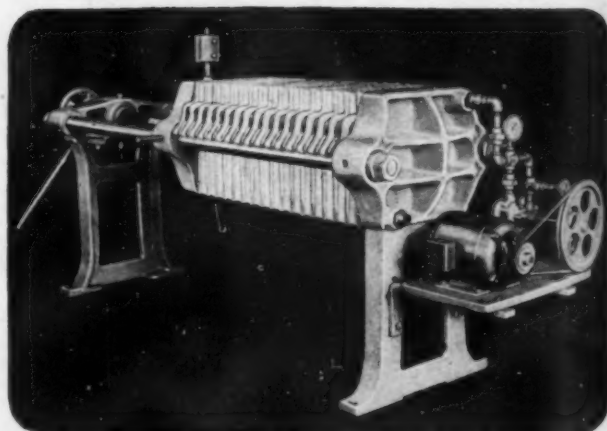
For over 46 years the Sperry staff has been recommending, designing and building filter presses for nearly every type of industrial filtration. Used for the recovery or separation of solids and liquids, washing of filter cakes, bleaching and decolorizing at high and low temperatures and varying pressures, these Sperry Filter Presses are efficiently operating in hundreds of war industries engaged in the production of vital supplies and munitions for our Armed Forces.

If you have a filtration problem, it will pay to consult Sperry. Send a sample of your material for testing. We'll gladly make an analysis and submit unbiased recommendations. There is no obligation.

D. R. SPERRY & COMPANY

BATAVIA, ILLINOIS

Filtration Engineers for Over 46 Years



Sperry 18" Filter Press, closed discharge, equipped with belt driven rotary pump and by-pass. Used for filtering volatile substances.

GET THE FACTS—The Sperry book contains valuable data and charts on industrial filtration. Write for your free copy today.



EASTERN SALES REPRESENTATIVE
Henry E. Jacoby, M. E.
205 E. 42nd St., New York 17
Phone: Murray Hill 4-3581

SPERRY

FILTER PRESSES

WESTERN SALES REPRESENTATIVE
B. M. Pilhasny
Merchants Exchange Bldg., San Francisco 4, Cal.
Phone: Do 0375



Resoweld

A better lining than rubber for many jobs

ON many a tank-lining job where rubber would not be satisfactory, Goodyear's new resinous-base synthetic product — RESOWELD — will give ample and lasting protection.

Besides being resistant to all acid, alkali and salt solutions ordinarily handled by rubber, RESOWELD works where rubber would fail, with nitric and chromium acids, alcohol, petroleum oils, gasoline, linseed and vegetable oils, soaps and similar materials.

Other advantages: RESOWELD can be field applied to all types of metal, wood and concrete tanks by trained Goodyear workmen, whenever equipment cannot be shipped to or from our Akron factory. Pipe and fittings must be factory lined in all cases. RESOWELD withstands temperatures up to 150° F. It doesn't deteriorate with age, or crack under mechanical shock. And, since it is a less critical material than natural or reclaimed rubber, RESOWELD can be supplied, under war regulations, to plants having reasonable needs.

Resoweld—T.M. The Goodyear Tire & Rubber Company



For complete data on any corrosion-proofing job, consult the G.T.M.—Goodyear Technical Man. Or write Goodyear, Akron 16, Ohio or Los Angeles 54, California.

GOODYEAR
THE GREATEST NAME IN RUBBER

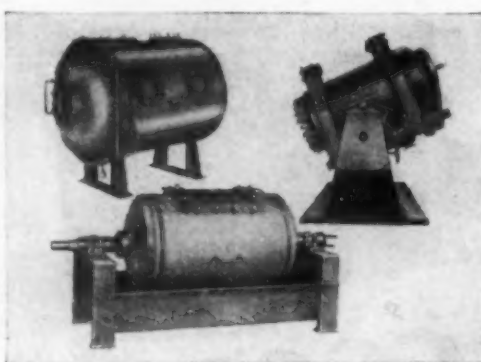


**THE SHAPE OF THE
FUTURE IS IN THE
HANDS OF TODAY**

WE cannot know what shape our postwar world will take, yet, paradoxically, we can shape that world. The hope of the future is that we will be ready for it when it comes, with ideas that are clearly formed, though flexible.

KOVEN is going to be ready for that new after-Victory world. Our engineers already are using KOVEN's 50 years of experience making individualized equipment, are already putting to work the new lessons learned from the precision jobs of war, to plan the future, with more than

vague dreams—with actual blue-prints. If you have an equipment problem today, or an idea for the improvement of your equipment for tomorrow, let KOVEN work on it with you, to plan and build equipment to your specifications. Call or write KOVEN today to have our representative visit you. A consultation with him will obligate you in no way.



Among the many KOVEN pieces of equipment are: pressure vessels, extractors, mixers, stills, condensers, kettles, tanks, chutes, containers, stacks, coils.



PLANTS:

JERSEY CITY, N. J.

DOVER, N. J.

L. O. KOVEN & BRO., INC.

154 OGDEN AVENUE

JERSEY CITY, N. J.

For Strong Adhesion...

DU PONT POLYVINYL ACETATE EMULSIONS

GRADE RH-460

Emulsion of low viscosity polyvinyl acetate. Heat-sealing temperature approximately 100°C.

GRADE RH-460-A

Emulsion of high viscosity polyvinyl acetate. Heat-sealing temperature approximately 125°C.

CHARACTERISTICS

Total solids 55% minimum
pH 4.0—6.0
Color Milk white
Weight per gallon 9 pounds

● STABILIZED DISPERSIONS IN WATER

● DO NOT REQUIRE EXPENSIVE OR FLAMMABLE SOLVENTS

● ALLOW DEPOSITION OF HEAT-SEALING ADHERENT FILMS which are stable to light, oxidation and aging—resistant to vegetable oils and animal fats.

● PROPERTIES CAN BE MODIFIED with common lacquer type plasticizers and many resins and gums.

● REPLACE RUBBER LATEX EMULSIONS IN CERTAIN APPLICATIONS

Like other vinyl polymers, Polyvinyl Acetate Emulsions are restricted by the War Production Board under Allocation Order M-10. Limited amounts for research and development may be furnished without allocation. If you feel these emulsions may help you, don't wait—clip the coupon below!

BONDING AGENTS FOR—
a wide range of materials—Cellophane, paper, cardboard, cloth, felt, straw, wood, cork, leather, metal, mica, stone, porcelain.

COMPATIBLE WITH—
lacquer types of nitrocellulose, considerable amounts of chlorinated rubber, shellac, dammar, elemi, ester gum, rubber latex, certain other natural and synthetic resins, moderate amounts of castor oil, acetylated castor oil (using blending agents).



POLYVINYL ACETATE

BETTER THINGS FOR BETTER LIVING
...THROUGH CHEMISTRY

Electrochemicals Dept.
E. I. du Pont de Nemours & Co. (Inc.)
Wilmington, Delaware

CM-11

Please send me literature on Polyvinyl Acetate Emulsions.

Name Title

Firm

Address



Whether you figure on better ways of doing old tricks or are whipping up a batch of new products for post-war, Readco engineers have the processing equipment you need.

This Single Packing Gland Double Arm Vacuum Mixer with exclusive features that eliminate the possibility of contamination is an example. It was developed for the manufacture of paints, flush colors, inks, phenol, urea, cellulose acetate compounds and plastics in general, as well as many pharmaceutical products. It is designed for operation under high vacuum, enabling the evaporation of moisture or solvents from materials being mixed at temperatures below their atmospheric boiling point. It is also adapted for materials requiring treatment in inert atmosphere or under elevated pressures.

Readco builds a complete line of these Single Packing Gland Double Arm Vacuum Mixers with working capacities from 2.5 gallon to 400.0 gallon, with total capacities from 4.0 gallon to 800 gallon. Readco also builds a complete line of laboratory mixers, pilot plant mixers, standard and special mixers, as well as material handling equipment and automatic dustless weigh hoppers. Write today for a complete Readco Catalogue.

GLE PACKING AND CONSTRUCTION . . .

Removable shaft seals, an exclusive READCO development, are installed between the mixing chamber and the vacuum chambers on each arm shaft. One seal prevents leakage on a rotating member is where the drive shaft projects through the arm gear case.

LOSE CLEARANCE MIXING AGITATORS . . .

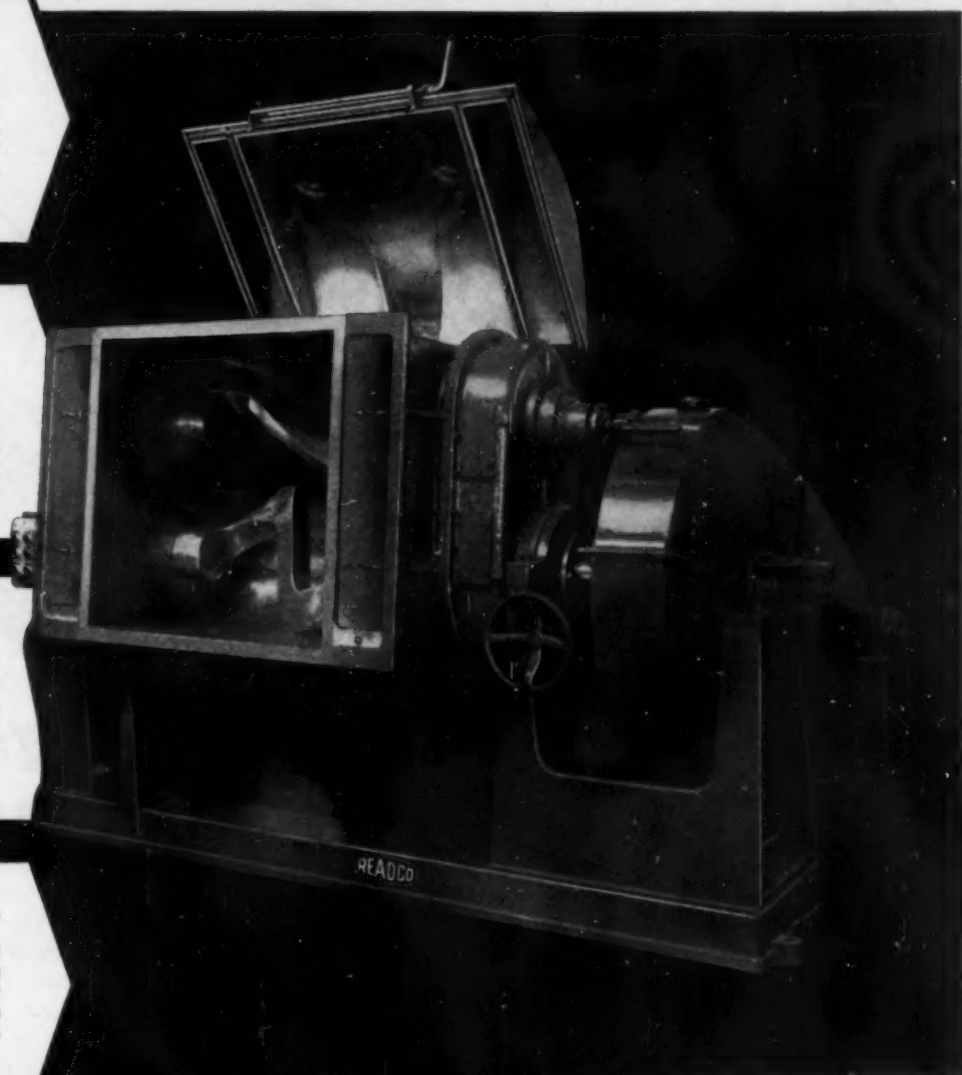
Mixing arms are overlapping or tangential, sigma or other design as required, to insure perfect kneading and mixing action on the mass. Shape of arms enables ready discharge of mass from face of arm and prevents compression of the mass against

NAVY MIXING BOWL . . .

Integral cast bowl ends are secured to heavy bowl center section by means of screws. Bowl ends are cast integral with vacuum chambers in which are mounted friction or plain radial and thrust bearings supporting the main arm shafts.

JUSTABLE VACUUM COVER . . .

Bowl cover is supported in an eccentric roller bearing mounted on a supporting frame to provide adjustment. The cover is hollow and forms a flue which is connected to the vacuum line without the use of flexible connections.



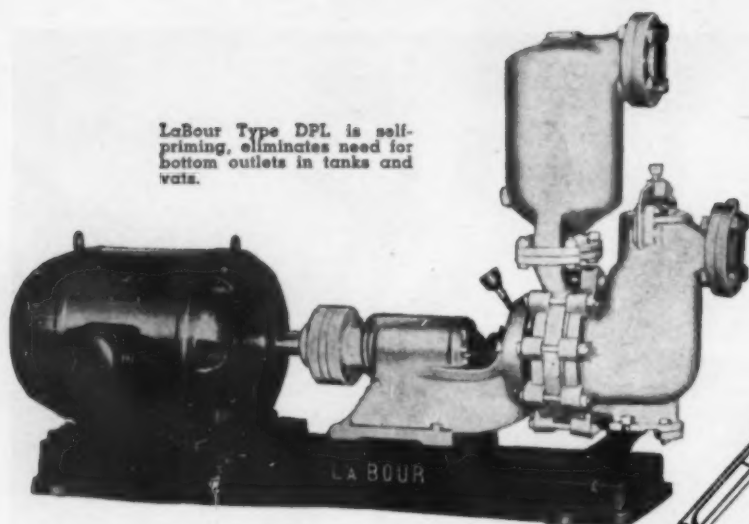
WHAT OUR "E" AWARD MEANS TO YOU

Our engineering and production skill have been greatly enhanced by the experience in manufacturing precision equipment for the Army and Navy.

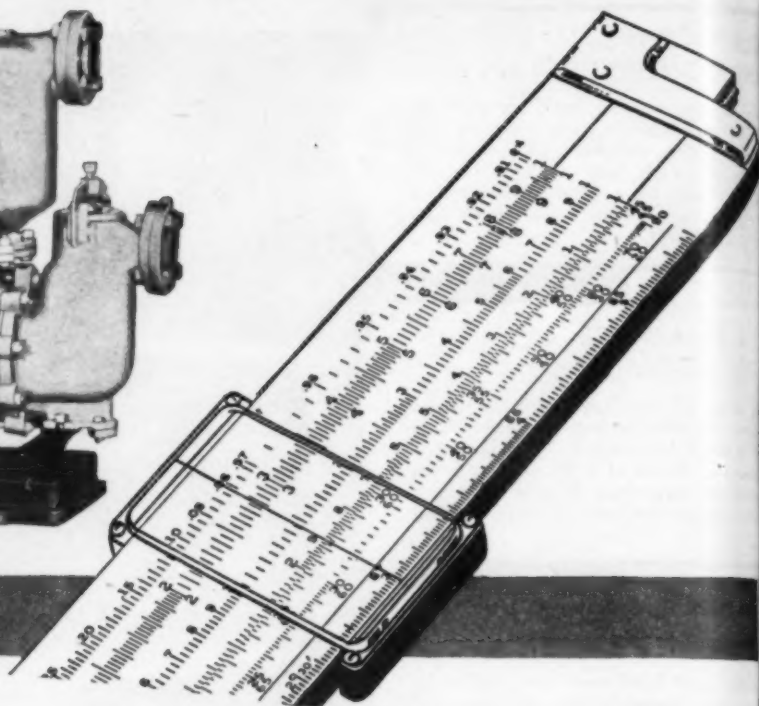
Readco has built up the facilities and the know-how to meet the most exacting military specifications for quantity production. We're proud that the "E" award the Army and Navy has said, "Well Done," to you, the chemical engineer and process equipment user. These added Readco facilities and experience mean better equipment at lower cost.

Read

MACHINERY CO., Inc.
YORK, PENNSYLVANIA



LaBour Type DFL is self-priming, eliminates need for bottom outlets in tanks and vaults.



LET'S TALK ABOUT **EFFICIENCY** IN ACID PUMPS

Fewer kilowatt-hours per ton of liquid pumped mean precious fuel conserved today — dollars saved in the competitive world of tomorrow. Therefore, the *efficiency* of the chemical pumps you buy is a matter of prime importance.

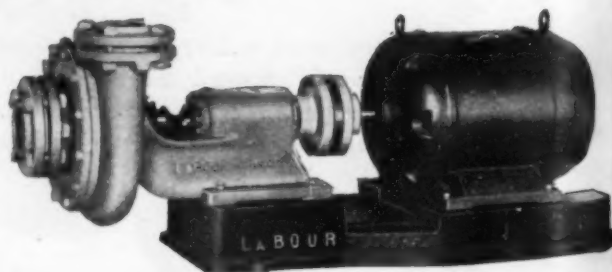
LaBour centrifugal pumps, of open impeller type construction without sealing rings or the like, attain efficiencies not commonly associated with centrifugal pumps. Your own comparisons, based on input and output specifications, will verify that quickly. With LaBour Type "Q" pumps, for example, efficiencies in

some cases run more than 80 per cent.

Equally significant is the fact that LaBour centrifugals *maintain* high efficiencies. That's because LaBour design does not depend on close clearances or other wear-vulnerable features. It's the result rather of skill and experience gained in handling the chemical industries' most difficult assignments for more than 20 years.

So whenever you want to talk all-important efficiency, talk to LaBour. As a starter, let us send you a copy of Bulletin No. 50 containing interesting facts and useful information. Write for your free copy today.

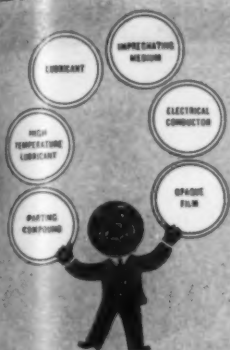
THE LABOUR COMPANY, INC.
Elkhart, Indiana, U. S. A.



LaBour Type Q is non-priming, but has sufficient air capacity to prevent binding.



CENTRIFUGAL PUMPS



"LET'S GET ON WITH THE WAR" these free booklets will help...

These 5 free booklets on dag colloidal graphite can help you in more ways than one. Each covers a different use or group of uses for dag products in industry. If you haven't used dag colloidal graphite or don't know all these uses meet Mr. dag today by writing for one or more of the booklets. Just clip the coupon.



ASSEMBLING AND RUNNING-IN ENGINES AND MACHINERY

Lists 10 advantages of adding dag colloidal graphite to liquid lubricants for these operations and tells why with photographs, charts, and simple, non-technical text.

BULLETIN No. 421

PARTING COMPOUNDS

Tells how dag dispersions prevent objectionable freezing, rusting or sticking together of metals and other materials. Cites use on screw threads, lamp bulbs, aviation and driving equipment; also in glass, rubber and foundry industries.



BULLETIN No. 422



HIGH TEMPERATURE LUBRICATION

How dag colloidal graphite takes over when the going gets too hot for conventional liquid lubricants. Gives examples in forging, oven conveyors, kiln cars, bottle and die casting machines, etc.

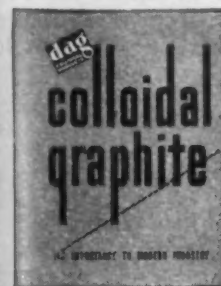
BULLETIN No. 423

"dag" COLLOIDAL GRAPHITE FOR IMPREGNATION AND SURFACE COATING

of textiles, asbestos, felt, abrasives, porous metals, paper, wood, etc. to impart lubrication properties, electrical conductivity, opacity, color, or other desirable qualities.



BULLETIN No. 431



GENERAL BOOKLET

The story of dag colloidal graphite. 12 pages fully illustrated. Gives the how and why of colloidalization, explains the various liquid carriers and suggests dozens of places where dag dispersions can speed up production.

BULLETIN No. 430

dag ACHESON COLLOIDS CORPORATION Port Huron, Michigan

Please send me free copies of the bulletins checked below:

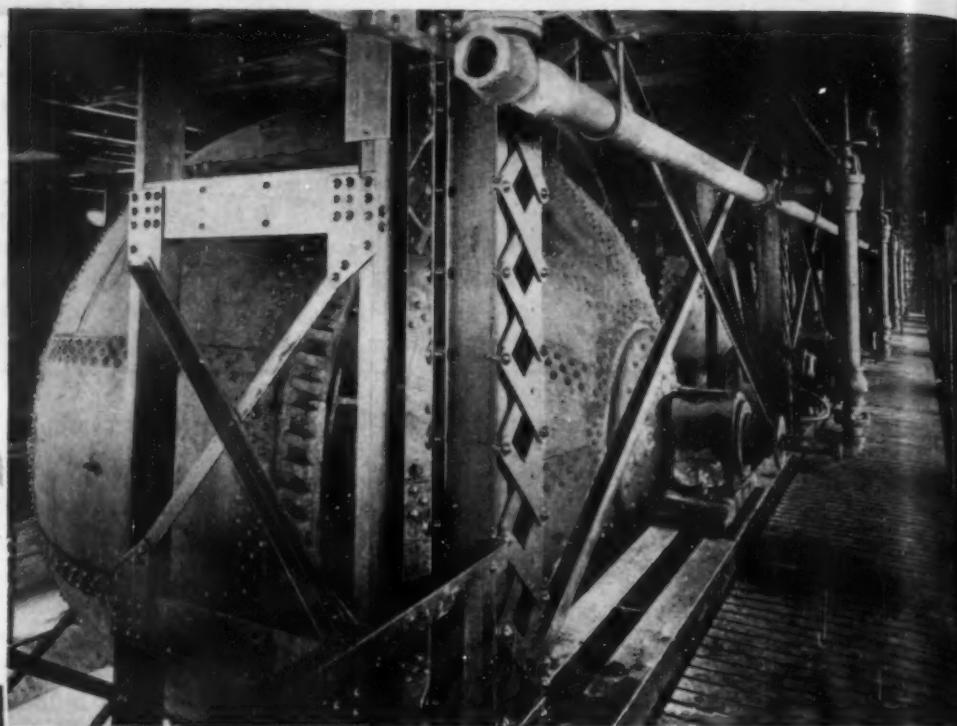
- No. 421 ☐ NAME _____
No. 422 ☐ COMPANY _____
No. 423 ☐ POSITION _____
No. 430 ☐ ADDRESS _____
No. 431 ☐ CITY & STATE _____

Our Present Oil Supplier Is _____
(Lubricants containing dag colloidal graphite are available from major oil companies.)

Dept. R.

"dag" is the registered trademark of Acheson Colloids Corporation

CLEANSING — DYEING — BONDING —
NEUTRALIZING — PRECIPITATING —
PURIFYING — BLEACHING — LUBRI-
CATING — OXIDIZING — ABSORBING
— CAUSTICIZING — CLARIFYING . .



Digester in straw-board mill, where Marblehead High Calcium Chemical Lime is used in cooking operations

ONE OF THE MOST IMPORTANT REAGENTS IN INDUSTRY

MARBLEHEAD *High-Calcium* CHEMICAL LIME

Chemical lime enters in some manner into almost every important type of manufacturing, in which chemical reaction or physical action take place. The impressive list includes such industries as STEEL, PAPER, BOXBOARD, WATER TREATMENT, LEATHER, FOOD PRODUCTS, PAINTS and VARNISHES, TEXTILES, BRICKS, GREASES, GLASS, SUGAR, GLUE, RUBBER, DYE STUFFS, INSECTICIDES, CHEMICALS OF MANY KINDS, and other products.

Marblehead Chemical Lime has effectively

served these and other industries for over 70 years, with consistent high calcium energy, uniform purity and utmost dependability.

With the finest high calcium limestone available from extensive quarries, manufactured under strict technical control by modern equipment and methods, Marblehead offers superior value for any process, in speed of reaction, accuracy, high economy, steady reliability. Our four forms of lime provide a selection for the best application to your own needs.

★ FOUR FORMS ★

TRY A CAR NOW IN YOUR OWN PLANT



POWDERED
QUICK LIME



PEBBLE LIME



HYDRATED
LIME



LUMP LIME

**MARBLEHEAD
LIME CO.**

**160 N. LaSalle St.
Chicago, Ill.**

**FREEZE
that FIRE!**

Randolph "4"

**CARBON DIOXIDE
FIRE EXTINGUISHER**

Model FF4-V

The Right Extinguisher—For flammable liquids—motors—electric fires—the Randolph "4" carbon dioxide unit is the fast and safe extinguisher—instantly discharges a penetrating, icy blanket of gas that freezes and smothers the fire completely, preventing its spread and damage to material.

In The Right Place—Convenient, portable, light, the Randolph "4" is quickly available. Detaches easily from its wall bracket. Guards periodic work that is fire hazardous. The Randolph "4" provides positive protection—it gets to the fire before the fire gets a start.

Quick to Operate—No valves to turn, hoses to adjust, horns to swing up, the Randolph "4" is panic proof—aimed and operated with one hand—the rigid horn permits accurate aim and control—a touch of the thumb—and the fire is out!

Leaves No Trace—Randolph "4" carbon dioxide gas is clean and harmless—not a trace of deposit, stain or contamination remains to injure machines, affect electric motors, damage material or destroy chemical formulae. **Convenient to Get**—Prompt delivery to all essential industries. Your supply house probably has the Randolph "4." If not—write, telephone or wire—



RANDOLPH LABORATORIES, INC.

8 EAST KINZIE STREET

CHICAGO 11, ILLINOIS, U. S. A.



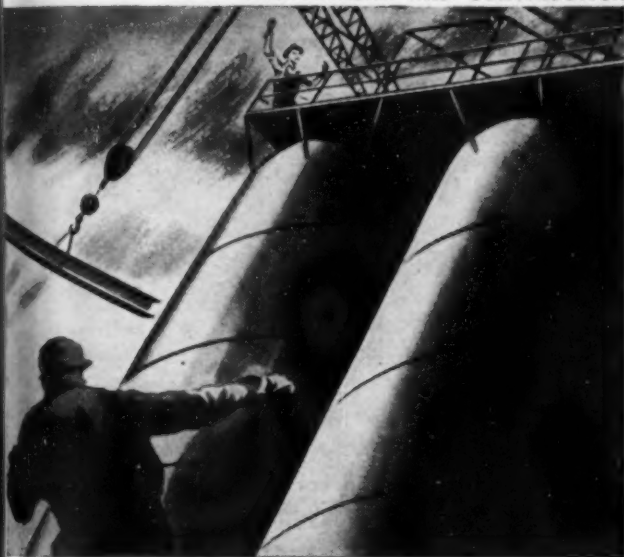
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PROCE
CHEMI

BATTLE STATIONS!

PROCUREMENT AND CONSTRUCTION



INITIAL PLANT OPERATION



War is still America's most serious business of the moment. Industrial efficiency is high—but not high enough. Production is huge—but still short of goals. Both objectives demand the redoubled effort of every loyal individual and concern.

BADGER is knee-and-elbow-deep in the kind of large-scale work for which Badger's long experience is particularly suited. Since Pearl Harbor—and before—Badger services have been heavily engaged in process engineering, design and construction for both Government and private war-production plants in the chemical, petroleum and petro-chemical fields.

The total number of Badger employees engaged on war projects to date would populate a small city. The many construction operations in which Badger has had an important part during the past three years extend through many states and foreign countries. They represent a value approximating the cost of several "Alcan" highways.

Conspicuous are plants for the manufacture of butadiene, alcohol, toluol, tri-nitro-toluene, plus many complete refineries for the production of aviation gasoline.

Badger is thoroughly equipped and manned to assume full respon-

sibility for the complete handling of any size project, from inception to final test-run operation. Around the key personnel of Badger's central organization are technical and laboratory engineers; design engineers and draftsmen; procurement, expediting and accounting experts; seasoned and efficiently supervised construction crews; experienced plant operators.

All these combine to afford the many advantages to be gained from placing everything in the hands of one qualified concern working in close co-operation with your own organization.

E. B. Badger & SONS CO.

BOSTON

EST. 1841

New York • Philadelphia • San Francisco • London

PROCESS ENGINEERS AND CONSTRUCTORS FOR THE CHEMICAL, PETROLEUM AND PETRO-CHEMICAL INDUSTRIES

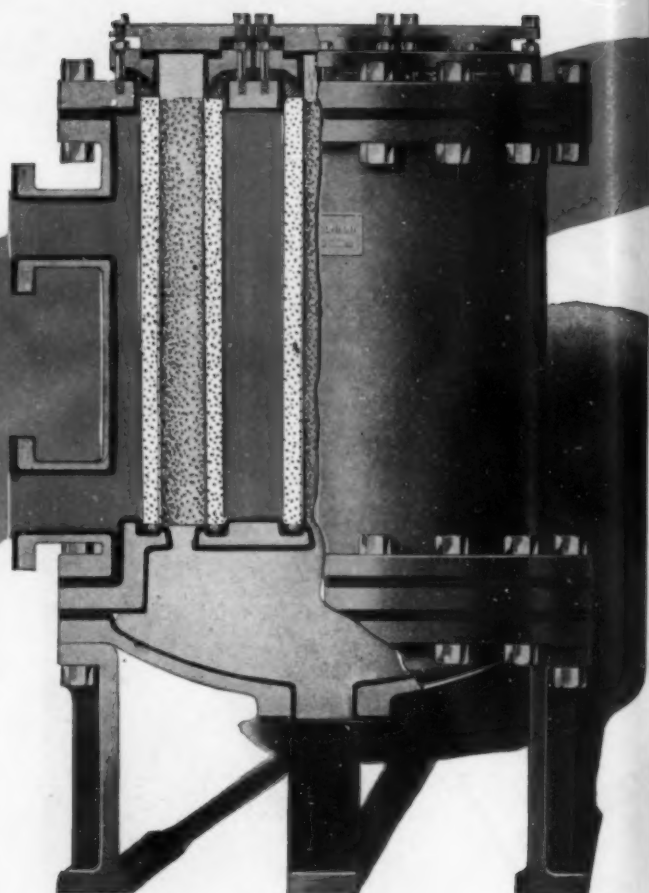
CHEMICAL & METALLURGICAL ENGINEERING • DECEMBER 1943 •

PORO-STONE

Filtration

for **ACIDS**

...AND CORROSIVE LIQUIDS



ADAMS PORO-STONE FILTERS embody the most advanced ideas in the design and construction of pressure filter equipment for acids and corrosive liquids. Supplied in two types—the rubber-lined "CFR" and the lead-lined "CFL"—each with its specific application depending on operating conditions. These totally enclosed filter units are compact, easily installed, readily cleaned by back washing. Special construction of PORO-STONE filter medium assures long life and a minimum of maintenance time and expense. Adaptable to a wide variety of industrial applications. Write for Bulletin 302, containing full details.

CORROSION RESISTANT

Heavy duty shell and all internal parts are lead or rubber lined. Corrosion resistant porous filtering medium and bonding material.

ACCESSIBILITY

Adams design permits inspection or removal of tubes without disturbing shell or piping conditions.

CLEANING

The cleaning process is easily, quickly and neatly accomplished by backwashing a single tube at a time or the complete shell.

INSTALLATION

The compact, self-contained design permits installation at floor level or elevated. Only three connections required.

R. P. Adams Co.

57 Chicago St.

Buffalo, N. Y.

ADAMS *Poro-Stone* ACID FILTERS

Lubrication *News* letter

Practical suggestions from the field on how Lubrication Engineering and lubricants are being used by midwest operators to lick tough wartime jobs.

DECEMBER, 1943



Eliminates need for cooling lines to mill bearings. Open cellar, grease lubricated bearings on a large ball mill at a Missouri paint company ran dangerously hot. The first remedy tried was expensive. Air and water lines, run to the bearings, helped reduce temperature somewhat. The second attempt was simple. A Standard Lubrication Engineer was called in. He suggested a test of Stanolind Mill Grease. In the first 10-hour test, bearings ran cooler. After two days, it was evident that the cooling lines would not be needed. Bearing temperatures dropped 45° F. to 115° F., and stayed there, with Stanolind Mill Grease as a lubricant and no special cooling.

Avoids shutdown of bar rolling mill. Worn splines on the shaft of a rolling mill caused waves in the bar material being rolled. A shutdown for repairs seemed unavoidable, as the condition of the splines would undoubtedly become worse. But a Standard Lubrication Engineer was a regular caller at this Detroit plant. Someone remembered to mention the problem to him. He suggested trying a comparatively new product—Calumet Viscous Lubricant. It might stave off a shutdown for repairs. The cushioning effect of the lubricant took up the slack in the worn splines. Further wear has been stopped, and the mill is turning out satisfactory work, with every indication that it will operate until replacements can be made.

"Hydrant squirts dog" or how Engineer overcomes oil vapor. War restrictions made it necessary to seal doors and windows of a Missouri power plant. The lack of ventilation made the vapor from engine oil almost suffocating to men in the plant. But the plant engineer's chief worry, when he called a Standard Lubrication Engineer, was that this vapor would damage insulation on motors and generators. After analyzing the problem, the oil man recommended Stanoil, instead of the red engine oil formerly used. Stanoil not only solved the bad vapor problem, but also gave so much better yield in reclaiming that the plant engineer wishes he had changed years ago.

Beats hot bearing problem in heat-treating oven. Many homemade remedies have been concocted from time to time by plant men in attempting to lubricate hot bearings in heat-treating and drying ovens. Most of these are made at considerable cost in time, in getting special ingredients, or in mixing and applying them. A Detroit manufacturer took an easier way. He called

What are YOUR problems in maintenance and lubrication?

The few examples cited here are typical of jobs Standard Lubrication Engineers are doing daily for operators who have asked for help. Take the time to explain your problems to one of these Engineers. He may have a number of suggestions that will help you save much needed manpower, material, and scarce equipment. Call any Standard Oil Company (Indiana) office, or write 910 S. Michigan Avenue, Chicago 5, Ill., for the Engineer nearest you. In Nebraska, write Standard Oil Company of Nebraska at Omaha 2.



Knocks the peaks off of power demand. Better lubrication pays out in many unusual ways. A St. Louis company saves enough on power bills to pay the lubricating costs on two crushers—and then some. A simple change in lubricant did the trick. A Standard Lubrication Engineer thought it up.

The company's power bills were based on an abnormally high demand load. An analysis showed that two crushers were the principal cause. Because they were in an exposed location, starting them, even in moderately cold weather, shot power demands sky high. The Engineer recommended two grades of Stanolil—one for summer and one for winter. These cut the demand load enough to make a substantial reduction on the plant's electric power bill.

These unusual conditions required the *two* grades of Stanoil. Usually, on motors, reduction gears, and other equipment operating in exposed locations, the high viscosity index of Stanoil makes it possible to use only one grade the year around.

Oil is Ammunition . . . Use it Wisely

STANDARD OIL COMPANY (INDIANA)

**STANDARD
SERVICE**

★ LUBRICATION ENGINEERING

Take a Look at TOMORROW—*Today!*

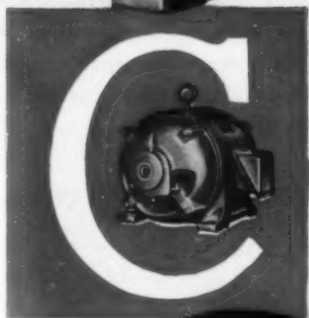
Mr. Now:

"In sun, rain, ice, or snow, this Century Splashproof Motor keeps running all year 'round."

Mr. Postwar:

"I'm going to specify Century Splashproof for other jobs that need such protection."

CENTURY SPLASHPROOF MOTORS are "*Weather Protected*" For All Outdoor Installations



342



For dependable, continuous service in outdoor applications, you can rely on Century Splashproof Motors for economical performance. They can be safely installed wherever they must be exposed to rain, snow, sleet, ice, or falling solids, and they'll stay on the job day after day.

Because this type of Century Motor is splashproof outside—moisture resistant inside, it's ideally designed for such outdoor installations as the cooling tower illustrated above.

In addition to this protection against all weathers, standard Century insulations are highly resistant to the absorption of moisture, mechanical impact of suspended particles, mild acids and alkalis. Special insulations can be furnished for high acid or alkali concentrations.

Century Splashproof Motors are only *one* of Century's wide variety of motor types, in sizes from fractional to 600 horsepower. Today—and tomorrow, it will pay you to consider Century whenever electric motor drives are required.

CENTURY ELECTRIC CO., 1806 Pine Street, St. Louis 3, Mo.
Offices and Stock Points in Principal Cities

One of the Largest **EXCLUSIVE** Motor and Generator Manufacturers in the World.

CHEMICAL & METALLURGICAL ENGINEERING • DECEMBER 1943 •

These Chemicals

Chemical	Formula	Boiling Point °C., 760mm.	Vapor Pressure mm., 20°C.	Solubility % by weight at 20°C.		Flash Point Open Cup°F.
				In Water	Water In	
Trichlorethane	$\text{ClCH}_2\text{CHCl}_2$	113.7	16.7	0.45	0.05	None
Diethyl "Cellosolve"	$\text{C}_2\text{H}_5\text{OC}_2\text{H}_4\text{OC}_2\text{H}_5$	121.4	9.4	21.0	3.4	95
n-Hexanol	$\text{CH}_3(\text{CH}_2)_4\text{CH}_2\text{OH}$	157.2	0.7	0.58	7.2	165
Methyl "Carbitol"	$\text{CH}_3\text{OC}_2\text{H}_4\text{OC}_2\text{H}_4\text{OH}$	194.2	0.2	Complete	Complete	200
Hexyl Ether	$\text{C}_6\text{H}_{13}\text{OC}_6\text{H}_{13}$	226.2	0.07	<0.01	0.12	170

are available in limited quantities

Here are five synthetic organic chemicals that were available in drum quantities at the time this magazine went to press. Have you investigated their possible uses in your processes? Some of them may help meet your present raw material needs.

Trichlorethane is colorless, non-flammable, and stable under ordinary conditions of use. It is a good solvent and extractant for most oils, fats, waxes, natural rubber, and some types of synthetic rubber.

Diethyl "Cellosolve," a stable ether, dissolves both oils and water and is an excellent mutual solvent. With alcohol, it is a solvent for nitrocellulose.

n-Hexanol is an excellent solvent for hydrocarbons, linseed oil, shellac, rosin,

gums, and dyestuffs. It is also used in hydraulic brake fluids.

Methyl "Carbitol" is miscible with water and many organic solvents. It is used in perfumes, textile dye pastes, non-aqueous wood stains, and lacquers.

Hexyl Ether is a mild-odored, stable liquid, with a high boiling point. It is used as an inert reaction medium, and as an anti-foam agent particularly in certain types of adhesives.



For information concerning the use of these chemicals, address:

CARBIDE AND CARBON CHEMICALS CORPORATION

Unit of Union Carbide and Carbon Corporation

30 East 42nd Street  New York 17, N. Y.



PRODUCERS OF SYNTHETIC ORGANIC CHEMICALS

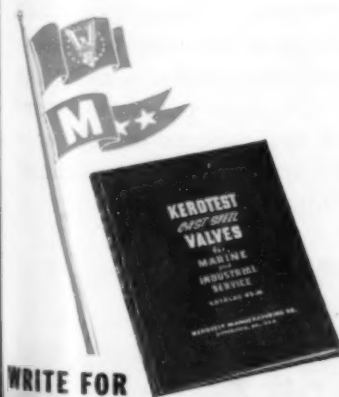


**A dependable source of supply for
Industrial Steel Valves**

★ ★ ★ **handling fluid for any pressures
from 150 to 1500 pounds...in alloys
to established standards, or to your
own specifications** ★ ★ ★

**WITH COMPLETE DEPENDABILITY
AND DURABILITY...**

Always

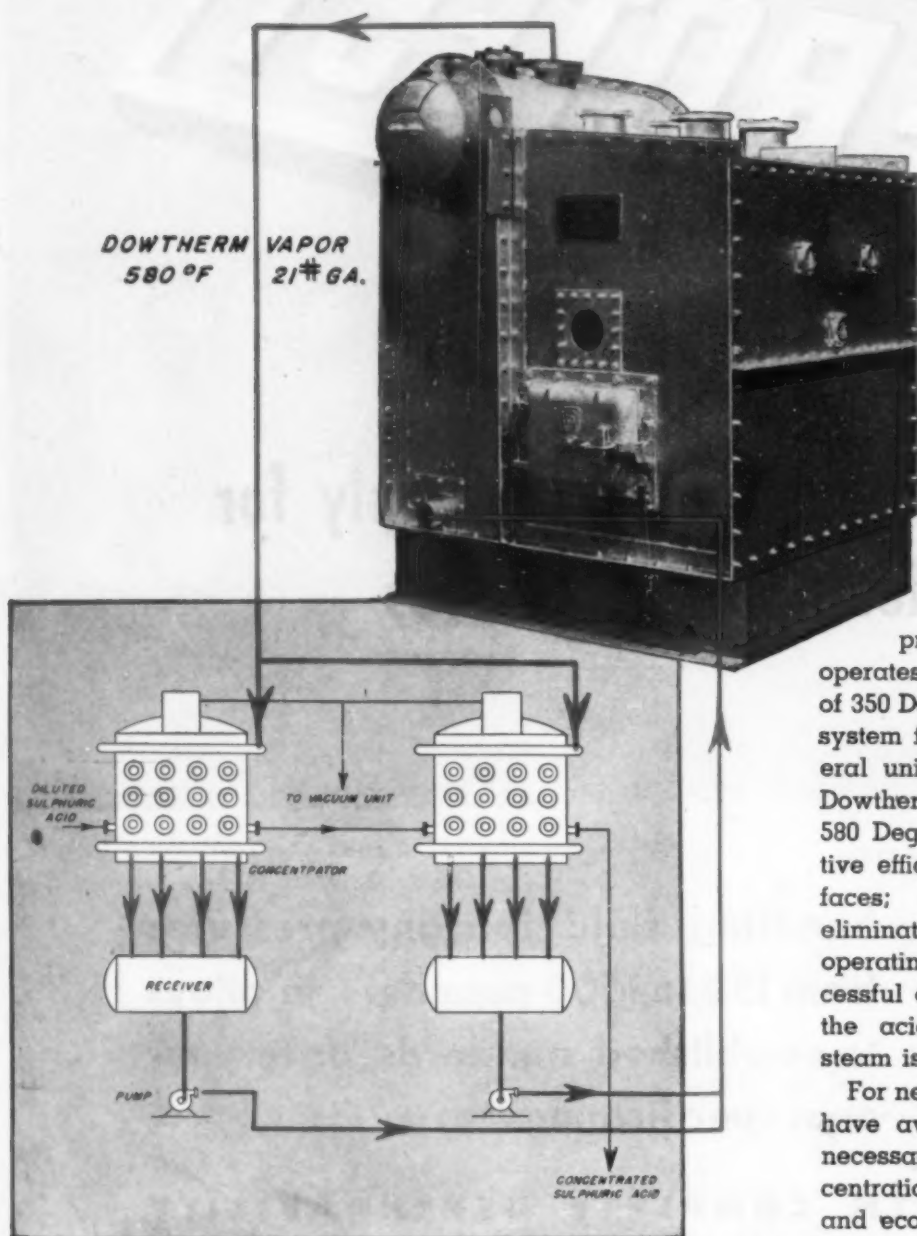


WRITE FOR

**Do you have the Kerotest Cat-
alog in your reference files?**

KEROTEST MANUFACTURING COMPANY
Pittsburgh, Pennsylvania

Sulphuric Acid Concentration with DOWTHERM PROCESS HEATING



The Simmonson - Mantius process for reconcentrating H_2SO_4 operates under vacuum with temperatures of 350 Deg. F. or higher. Use of a Dowtherm system for the process heating offers several unique advantages. The condensing Dowtherm Vapor at 21 psi pressure and 580 Deg. F. gives the maximum evaporative efficiency with minimum heating surfaces; costly pressure equipment is eliminated. In addition Dowtherm's high operating temperature makes possible successful operation with only two stages of the acid concentrator. Normally, when steam is used, three stages are necessary.

For new users of this process who do not have available the high pressure steam necessary for the higher stage of acid concentration, Dowtherm offers the practical and economic solution.

FOSTER WHEELER CORPORATION, 165 BROADWAY, NEW YORK 6, N. Y.

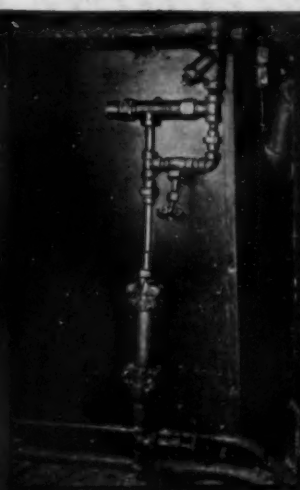
FOSTER



WHEELER



OUTDOOR TANK



PLATING

The Steam Trap with a Brain

CONTROLS TEMPERATURE WHILE REMOVING CONDENSATE

Here's one for your book! A steam trap that opens only when the tank or kettle is at the temperature which you select. Only a company making both steam traps and control could have thought of it. You can see that it has the elongated Sarco bellows like a temperature regulator, but otherwise is as simple and inexpensive as a steam trap.

That's why thousands of these special trap controls are used for process steam heated equipment and tanks heated by steam coils. Because it cannot freeze, it is also used for long steam lines outdoors, and even for radiators, coils, and heater lines in the refinery, coal, and other outdoor industries.

Several forms of this trap are available. Please tell us exactly what you want to accomplish. Hook-ups are shown in Catalogs Nos. 250 and 550.

SARCO COMPANY, INC.
475 FIFTH AVENUE
NEW YORK 17, N. Y.

SARCO 87



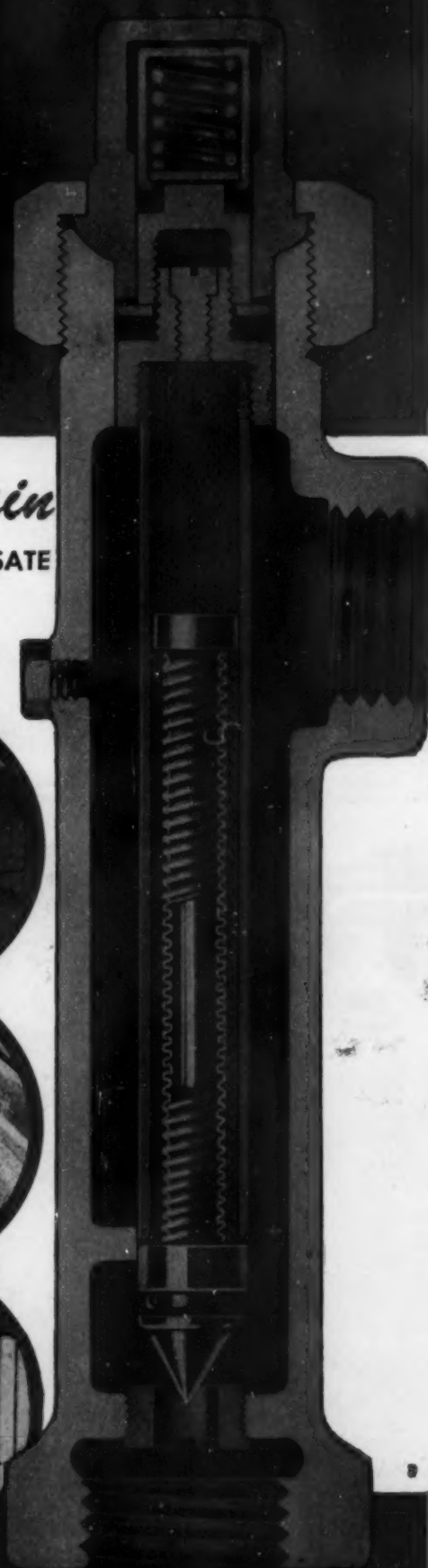
FOOD



CHEMICAL



OUTDOOR



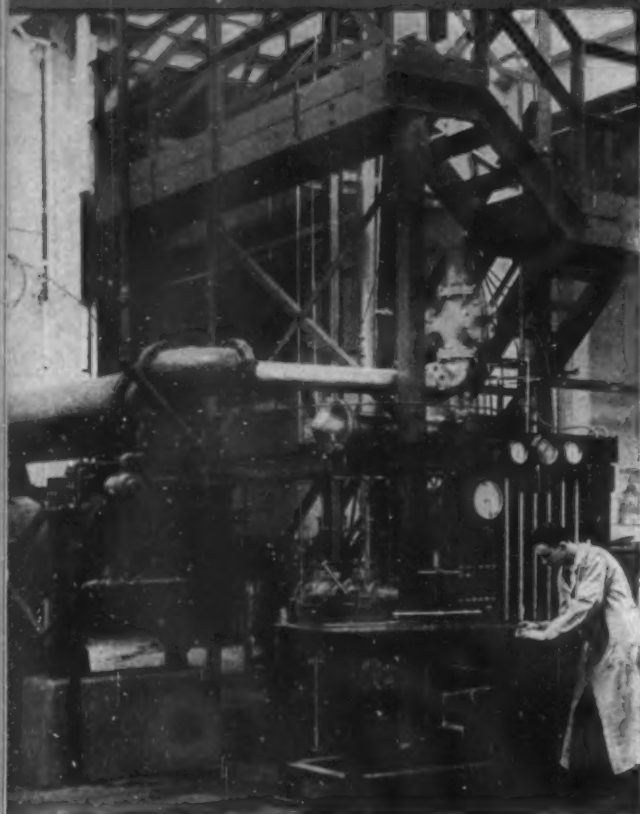
SARCO

Saves Steam

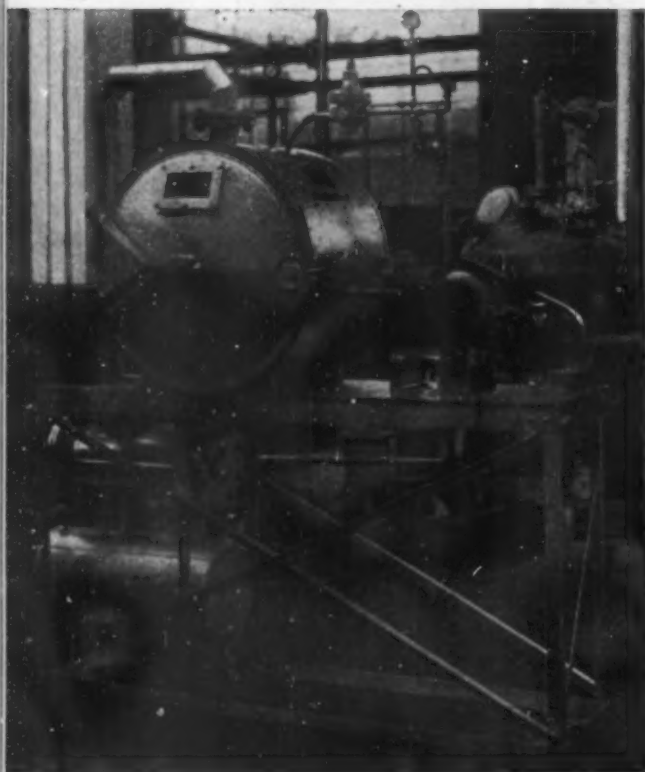
SARCO CANADA, LTD., 85 Richmond Street, West, TORONTO, ONTARIO

Represented in Principal Cities

Buflovak Can help you work out the



A Special research evaporator in the Buflovak Laboratory, scientifically equipped for the study of evaporator performance.



BUFLOVAK Laboratory Vacuum Double Drum Dryer, portable type, Self-contained unit, including surface condenser, steam air ejector and receiver.

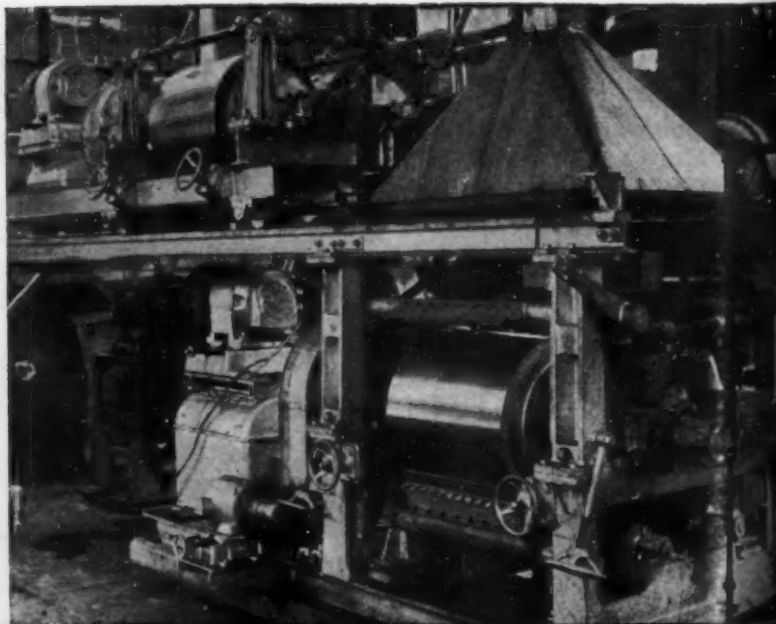
5000 processing problems effectively completed by the **Buflovak's RESEARCH LABORATORY**

TODAY there are many changes in processing problems. Tomorrow promises even more. BUFLOVAK has assisted many manufacturers in keeping abreast of these changes.

In completing nearly 5000 processing problems on a semi-plant production scale, BUFLOVAK Engineers have acquired valuable data that are not in the text books. For over 35 years, a staff of technicians have been working in a Laboratory kept equipped with the latest type apparatus. Thousands of tests, involving drying, evaporation, extraction, impregnation, solvent recovery, and crystallization, have been handled. Definite results were achieved, because the tests were conducted on semi-plant scale equipment to show final results, product characteristics, costs and capacity.

Today these research and testing facilities are doubly valuable in solving today's changing problems and the needs of tomorrow. Our highly specialized technical staff will share their experience and counsel without obligation—or your technicians may conduct their own tests and experiments. Always the results are strictly confidential. The final object being to show unmistakably, right at the start, what may be obtained from a given process.

A combined Twin and Double Drum Dryer that can be operated with every known variable applicable to drum drying.



BUFFALO FOUNDRY &

1551 FILLMORE AVENUE

production kinks for your new materials

Modernized Process Equipment

EVAPORATORS

Vertical Rapid
Concentration
Forced Circulation

Acid Recovery
Continuous Operation
Salting-Out

Single and Multiple
Effects

DRYERS, ATMOSPHERIC

Double Drum
Hot Air Rotary
Jacketed Pan

Single Drum
Twin Drum

DRYERS, VACUUM

Chamber
Drum
Impregnating

Pan
Rotary
Shelf

SOLVENT RECOVERY AND DISTILLATION EQUIPMENT

CASTING

Bronze
Chemical

Lead
Semi-Steel

CRYSTALLIZERS

Atmospheric
Continuous

Thermo-Vacuum
Vacuum

CHEMICAL PLANT EQUIPMENT

Autoclaves
Caustic Flakes
Caustic Pots

Flaking Machines
Fusion Kettles

Jacketed Kettles
Nitraters

Reducers
Sulphonators

FOOD PROCESSING EQUIPMENT

Extractors
Evaporators

Fumigators

Process Kettles

Sterilizers

VULCANIZERS (for rubber footwear, etc.)

COPPER, BRONZE, ALUMINUM, STAINLESS STEEL, STAINLESS-CLAD, NICKEL,

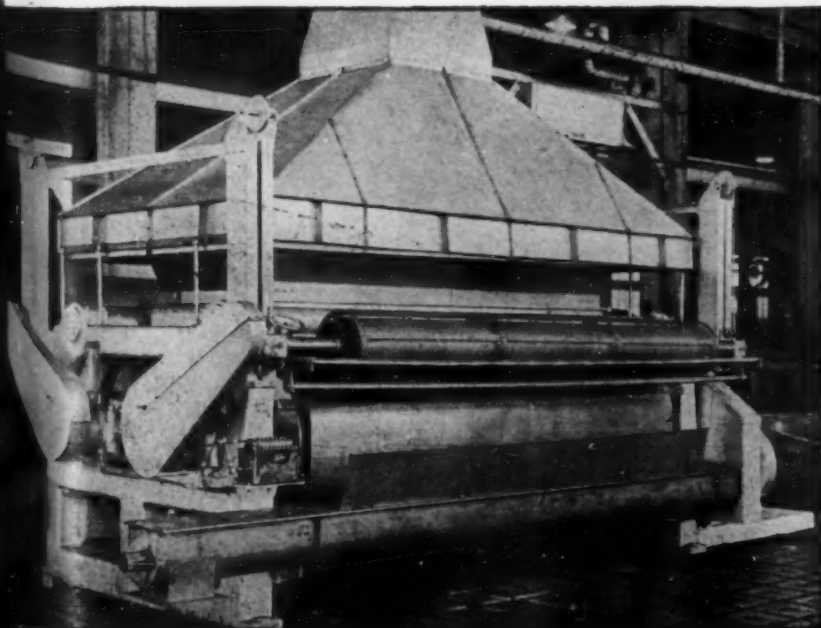
NICKEL-CLAD STEEL AND MONEL METAL EQUIPMENT

Coils
Distillation Apparatus

Evaporators
Welded Fabrication

Kettles
Still

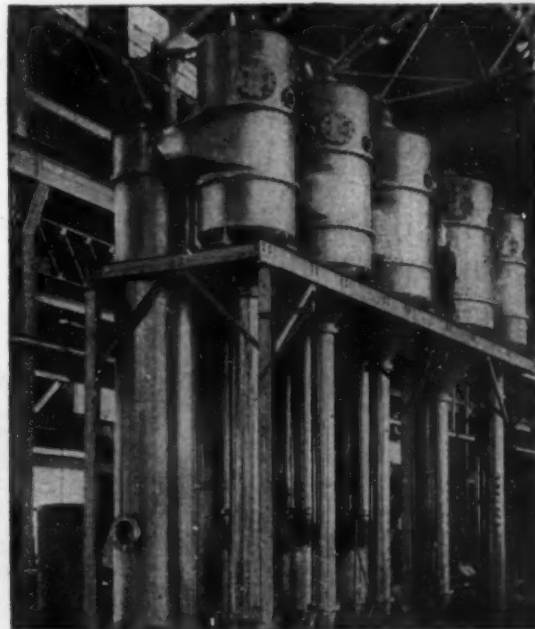
BUFLOVAK Atmospheric Double Drum Dryer, 42" x 120". Used for drying concentrated distillery solubles. This dryer is equipped with a patented Pendulum Feed for distributing the liquid material uniformly between the drums and a patented Cooling Reel over which the sheet of dry material passes before entering the conveyor.



BUFLOVAK Vacuum Double Drum Dryer, used for drying a heat-sensitive liquid. Other types are built for drying food products. Distinctive results in operation and finished product are accomplished.



BUFLOVAK Atmospheric Single Drum Dryer, 5' x 12' enclosed type, to eliminate dust and toxic hazards.



BUFLOVAK Multiple Effect Evaporator with a total of 8120 sq. ft. of heating surface.

Y & MACHINE COMPANY
BUFFALO, NEW YORK

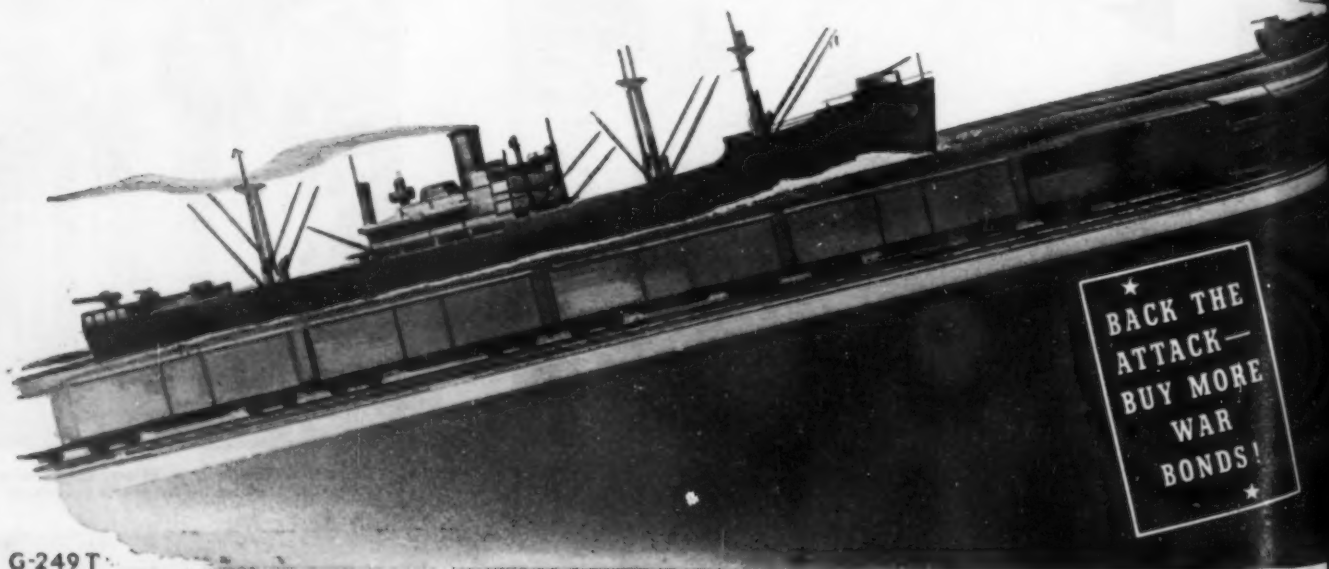
Rebuilding a World is *for* **STEAM**

The tough tasks of steam plant rehabilitation and development, will fall on engineers who are now serving their country in the armed forces, or in the never-ending battle with power-plant problems in war plants and in public utility plants supplying power to war plants. In this they are applying their engineering knowledge and skills to the early conclusion of hostilities.

When the war will have ended and Victory is ours, these engineers will re-direct their knowledge and skills from war-making activities to the production of steam power for peaceful pursuits, utilizing whatever of their background of war experience is applicable to future industrial development.

We of Babcock & Wilcox have implicit confidence in their resourcefulness, confidence in their ability to continue overcoming almost impossible assignments. Serving other engineers has also kept us on our mettle, as evidenced by important B&W contributions to the continued evolution of practice in steam generation.

While the war effort has first call on your industry's time and resources, you undoubtedly have given some thought to the postwar power-plant problems that will confront you, as it is never too early for engineering planning. B&W engineers will gladly cooperate with you to the utmost of their ability, consistent, of course, with war demands on their time.

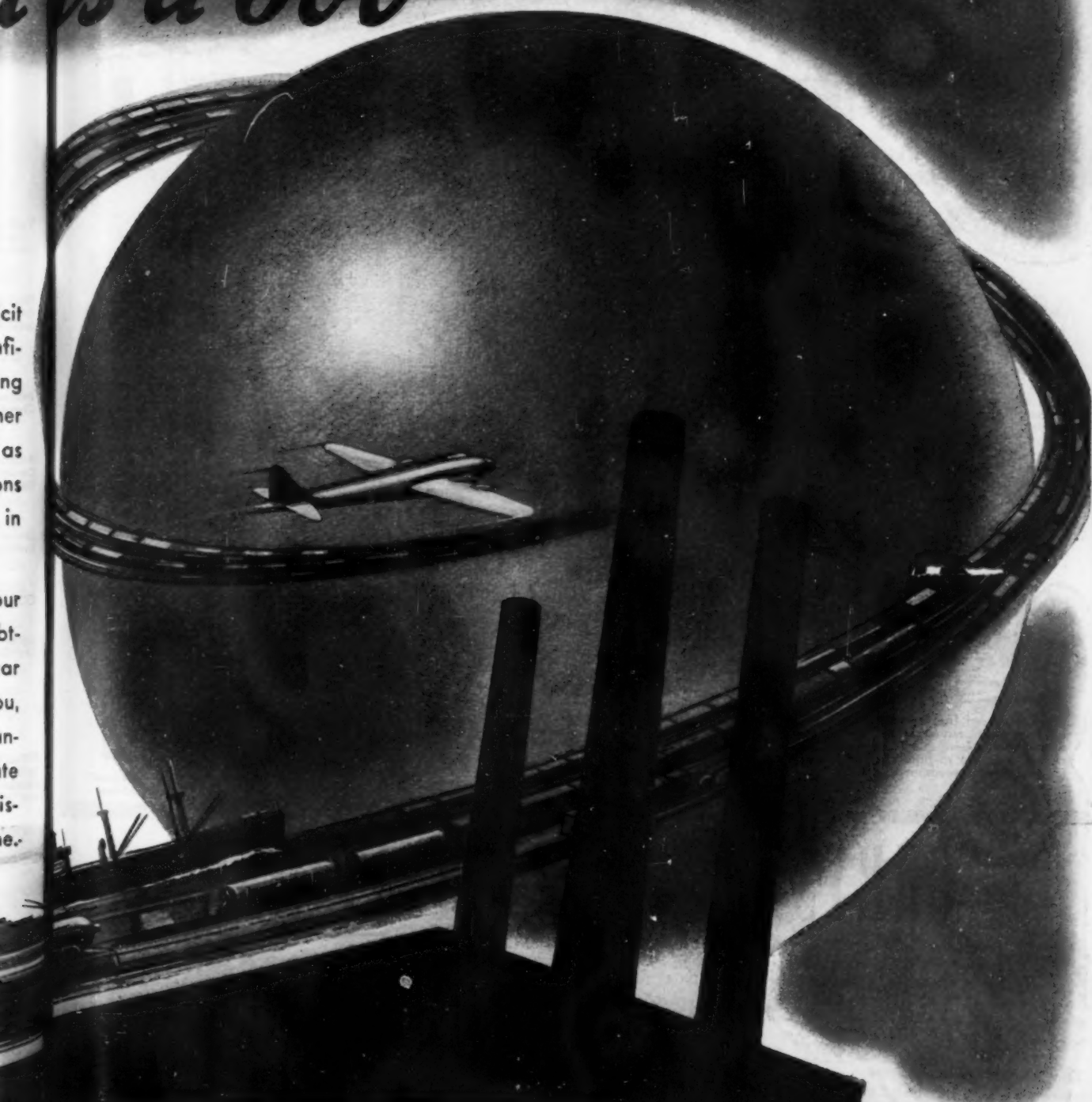


G-249 T

It is a Job

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THE BABCOCK

85 LIBERTY STREET
NEW YORK 6, N. Y.

& WILCOX CO.



Fresh food on the high seas during long, heavy-action periods away from port is the result of compact, efficient refrigeration.



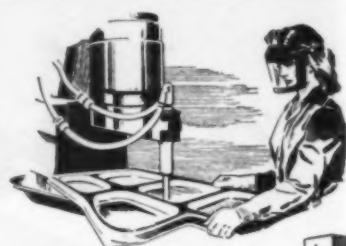
Self-Contained
1/4 h.p. Refrigerating Unit



Cool, clean air protects the life of the wounded in Army hospitals. Special aircraft refrigerators safeguard serums and plasma.



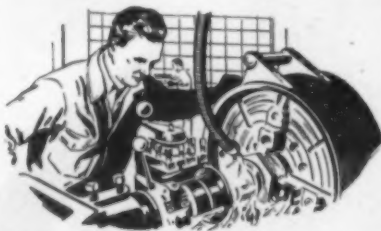
Aluminum
Aircraft Refrigerator



Peak welding efficiency is made possible by cooling of welding tips with water or brine held at the right temperature.



Spot Welder
Tip Cooling Unit



Tool life is increased and rejections are fewer when cutting oils used in high-speed machining are properly cooled.



Refrigerating Unit



The health of our armed forces is protected by dependable refrigeration in cantonments, huts, barracks, and on ships.



14 Cylinder
Refrigerating Compressor



Super accuracy in gauge rooms is possible when the air is clean, dehumidified, and maintained at a constant temperature.



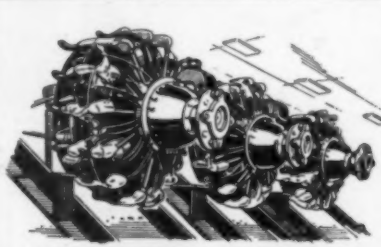
3 h.p. "Packaged"
Air Conditioner



Protection in the tropics against the ravages of humid atmosphere and vermin is necessary to preserve food and equipment.



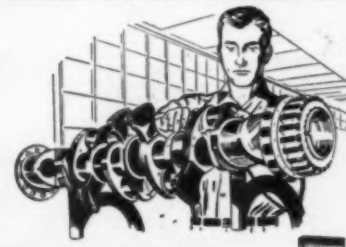
Portable Panel
Refrigeration Unit



Identical performance of aircraft engines is assured by operation tests with carburetor air kept at the same temperature.



14 Cylinder
Air Conditioning Compressor



Clean, dry atmosphere is vital for machining sensitive metal surfaces where a spot of rust would ruin high-precision products.



5 h.p. "Packaged"
Air Conditioner

★ CHRYSLER AIRTEMP AT WAR ★



From tiny, fractional horsepower to big 75 horsepower units, Chrysler Airtemp Radial Compressors are performing a major war job on both the production and battle fronts.

The science of air control is built around the compressor. Chrysler Airtemp's exclusive Variable Capacity Radial Compressor provides a new efficiency and accuracy in indoor climate regulation. The radial cylinders cut in or out automatically, one at a time, to meet varying load requirements. This flexibility eliminates the peaks and valleys resulting from abrupt starting and stopping of ordinary compressors... holds temperature and humidity at a constant level.

Years spent in building delicate mechanisms, have developed high-precision, versatile skills at Airtemp, now devoted to war production. Backed by Chrysler Corporation research and engineering, when peace comes, these skills will again create heating, cooling and refrigeration units for homes and commercial use that will set new, high standards of efficiency and performance.

The lessons learned during peace in free competitive enterprise—freedom of the individual to produce and compete—today bring strength to a nation at war.

War Products of Chrysler Corporation

Tanks • Tank Engines • Navy Anti-Aircraft Guns • Army Anti-Aircraft Guns • Bomber Fuselage Sections • Bomber Wings • Bomb Racks • Bomb Shackles • Fighter Landing Gears • Aluminum Alloy Forgings • Aluminum Alloy Castings • High-Powered Aircraft Engines • Cycleweld Cement • Wide Variety of Ammunition • Anti-Tank Vehicles • Command Reconnaissance Cars • Troop and Cargo Motor Transports • Ambulances • Weapons Carriers • Gyro-Compasses • Navy Pontoons • Marine Tractors • Harbor Tugs • Marine and Industrial Engines • Smoke Screen Generators • Air Raid Sirens and Fire Fighting Equipment • Powdered Metal Parts • Cantonment Furnaces • Tent Heaters • Refrigeration Compressors • Field Kitchens • and Other Important War Equipment

Tune In Major Bowes every Thursday, CBS, 9 P. M., E. W. T.

Chrysler Corporation

PLYMOUTH • DODGE • DE SOTO • CHRYSLER • AIRTEMP • AMPLEX
BACK THE ATTACK—BUY WAR BONDS



**SHALL WE "WRAP UP"
A NEW PLANT FOR
YOU, TOO?**

It is one of Blaw-Knox' regular functions to create process plants, *complete*, from idea to operation. Research, engineering, fabrication, erection and initial operation—all these things done under *one* responsibility are your best guarantee of satisfaction.

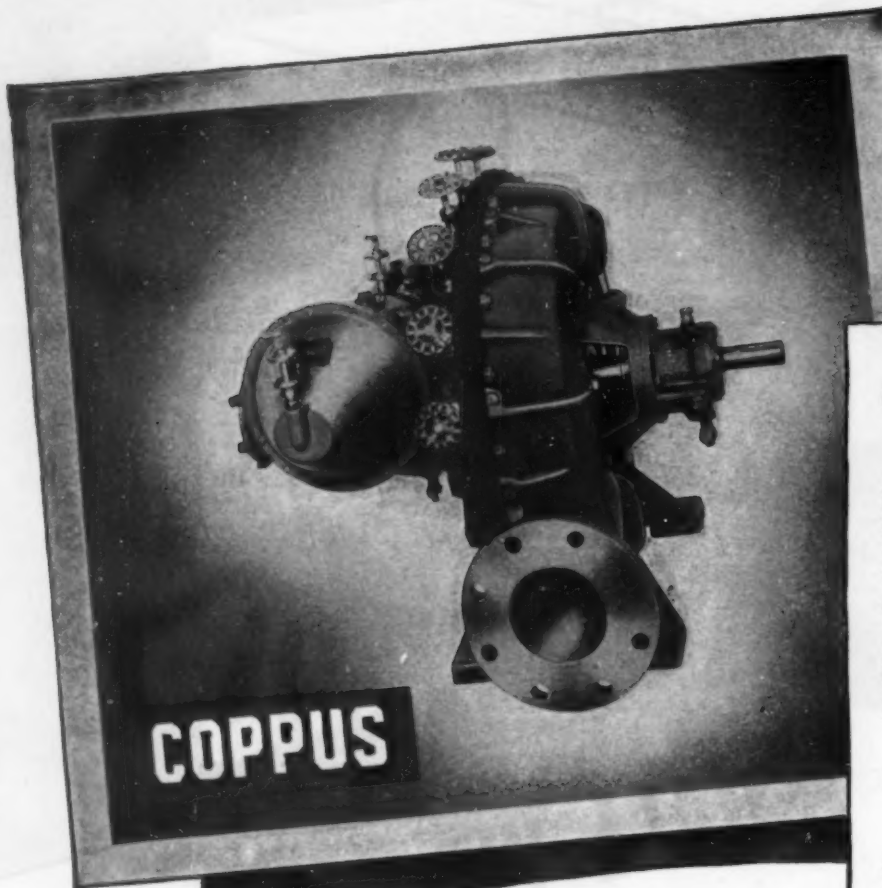
We are in a position *now*, exceedingly well prepared *now*, to undertake such work. Our specialists will be glad to discuss your construction or equipment problems with you.

**PROCESS PLANTS
ENGINEERED AND
BUILT, COMPLETE**

BLAW-KNOX DIVISION
OF BLAW-KNOX COMPANY
2090 FARMERS BANK BLDG.
PITTSBURGH, PENNSYLVANIA



BACK THE ATTACK—WITH WAR BONDS



COPPUS TURBINES

**Save Metal in Wartime — Will
Save You Money in Peacetime**

Like all Coppus "Blue Ribbon" Products (blowers, ventilators, gas burners, etc.), the Coppus steam turbine is a precision-made product . . . controlled by Johansson size blocks . . . and every turbine is dynamometer-tested before shipment. More than 85% of all orders since 1937 have been repeat orders.

Write for Bulletin 135-9











COPPUS ENGINEERING CORPORATION

372 Park Avenue,
Worcester, Mass.

Sales offices in Thomas Register; Products in
Sweets and Chemical Engineering Catalog

BLUE RIBBON PRODUCTS

DESIGNED FOR YOUR INDUSTRY...ENGINEERED FOR YOU

If a **COPPUS** "Horse Power"  Steam Turbine can power your pump, blower, fan, stoker, dryer, mixer, etc. . . . then you'd waste  money and  metal buying an "Elephant Power"  Turbine. **COPPUS** Blue Ribbon  Turbines come in 6 frame sizes; matching size to job saves critical  metal for  war and money  for yourself. And the  blue ribbon means workmanship that promises peak  performance.

The portable extinguisher 80 feet long!



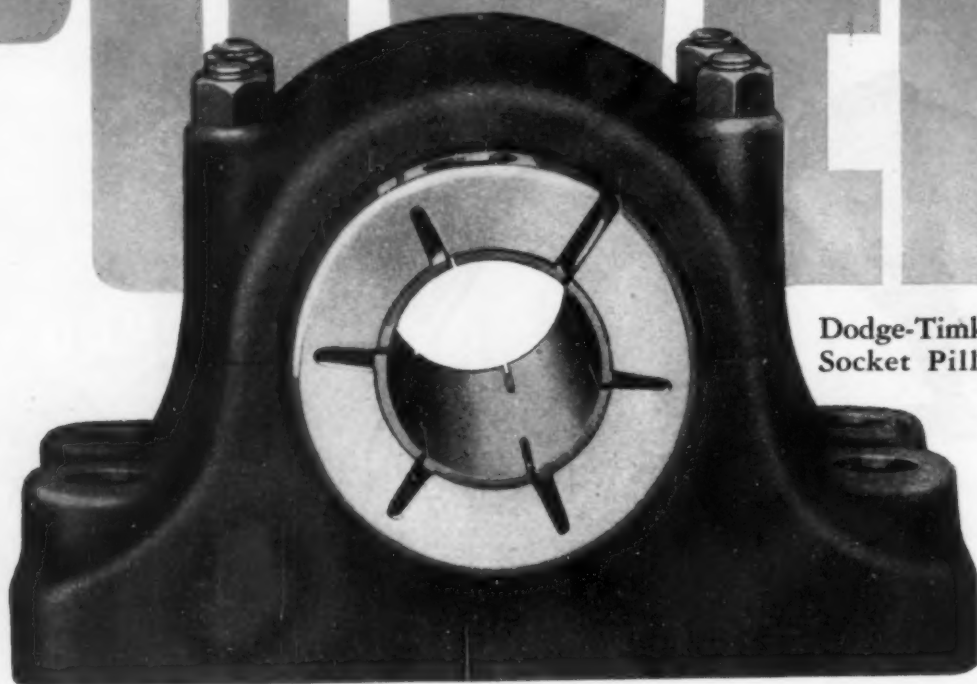
No, not the container...that's a handy unit only 7 inches in diameter by 27½ inches high. But the carbon dioxide it contains, stored under high pressure, expands 450 times in volume when it's released. That's enough of the fire-smothering gas to fill a cylinder 80 feet long by 2 feet in diameter! And that's why this Kidde product is one of the fastest fire-fighters known.

Walter Kidde & Company has prepared a booklet, "How to Teach Fire Fighting." It describes the various classes of fire, tells how to fight each of them. It explains why the most modern extinguisher can actually be a dangerous fire hazard, if it's used against the wrong fire! Write for your copy—it's free.



WALTER KIDDE & COMPANY, INC., 1223 MAIN STREET, BELLEVILLE, N. J.

POWER



Dodge-Timken Ball and Socket Pillow Block.

POWER IS VITAL TO VICTORY- *don't waste it*

How much power did you lose yesterday; how much will you lose today, tomorrow, the next day and so on? How much power are you paying for without getting any return in work done? You'll find the answer in your power transmission equipment. If it is modern—if it embodies line shaft hangers and pillow blocks equipped with Timken Tapered Roller Bearings, you'll

know power loss is negligible because friction is absent. Furthermore, you'll know you are enjoying additional economies through saving of lubricant; prevention of product damage as a result of lubricant leakage; and consistently low maintenance cost.

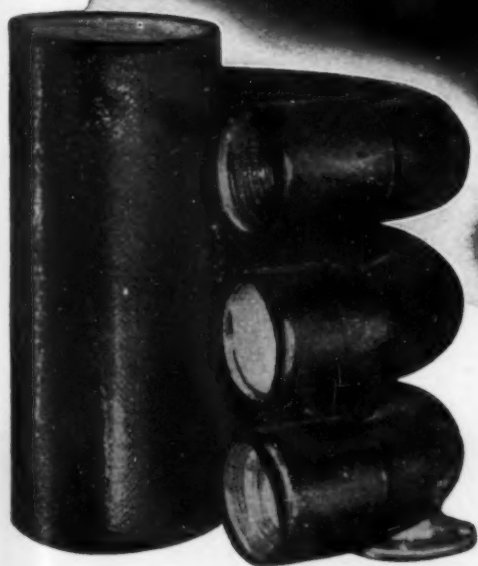
For Timken Bearings hold shafts permanently in dead true alignment; eliminate shaft wear; carry radial, thrust and combined loads with a wide margin of safety.

It will pay you to check your power transmission system now and replace obsolete units with up-to-date equipment containing Timken Bearings. The Timken Roller Bearing Company, Canton, Ohio.



TIMKEN
TRADE-MARK REG. U. S. PAT. OFF.
TAPERED ROLLER BEARINGS

IF IT'S PIPING CONTACT FLORI



We make anything in tubular or plate steel fabrication: Fabricated Piping —for steam, water, air, oil, gas, chemicals • Random mill or cut lengths, bent, coiled, welded, flanged, threaded • Valves, Pipe Fittings.

Send us your inquiries.

FLORI
PIPING

THE FLORI PIPE COMPANY • ST. LOUIS — CHICAGO

ANNOUNCING

a change in organization

Our friends in the metallurgical field will be interested in the announcement of a change in the activities of the Adolph I. Buehler organization.

This change is made in order to enable us to maintain a close personal contact with our customers and at the same time provide expanded facilities for handling the rapidly increasing demand for metallurgical testing equipment.

A new organization, Buehler, Ltd., a partnership under my personal direction, will hereafter handle all metallurgical apparatus and sample preparation equipment.

The optical equipment will continue to be handled by the Adolph I. Buehler organization supervised by Mr. George Graves who has long been associated with my staff and who will devote all his efforts to serve you in this field.

The policy of both companies will continue, as in the past, to present equipment of the highest standard of quality in both optical and metallurgical apparatus. Some new and important developments that are anticipated in the field of metallurgical testing apparatus make this change in organization of particular significance to the metallurgist.

Adolph I. Buehler



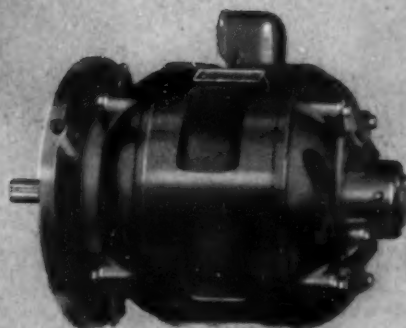
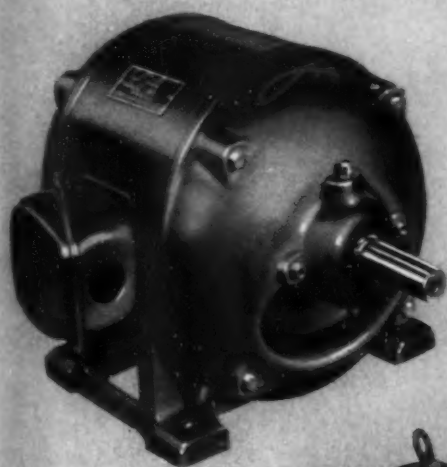
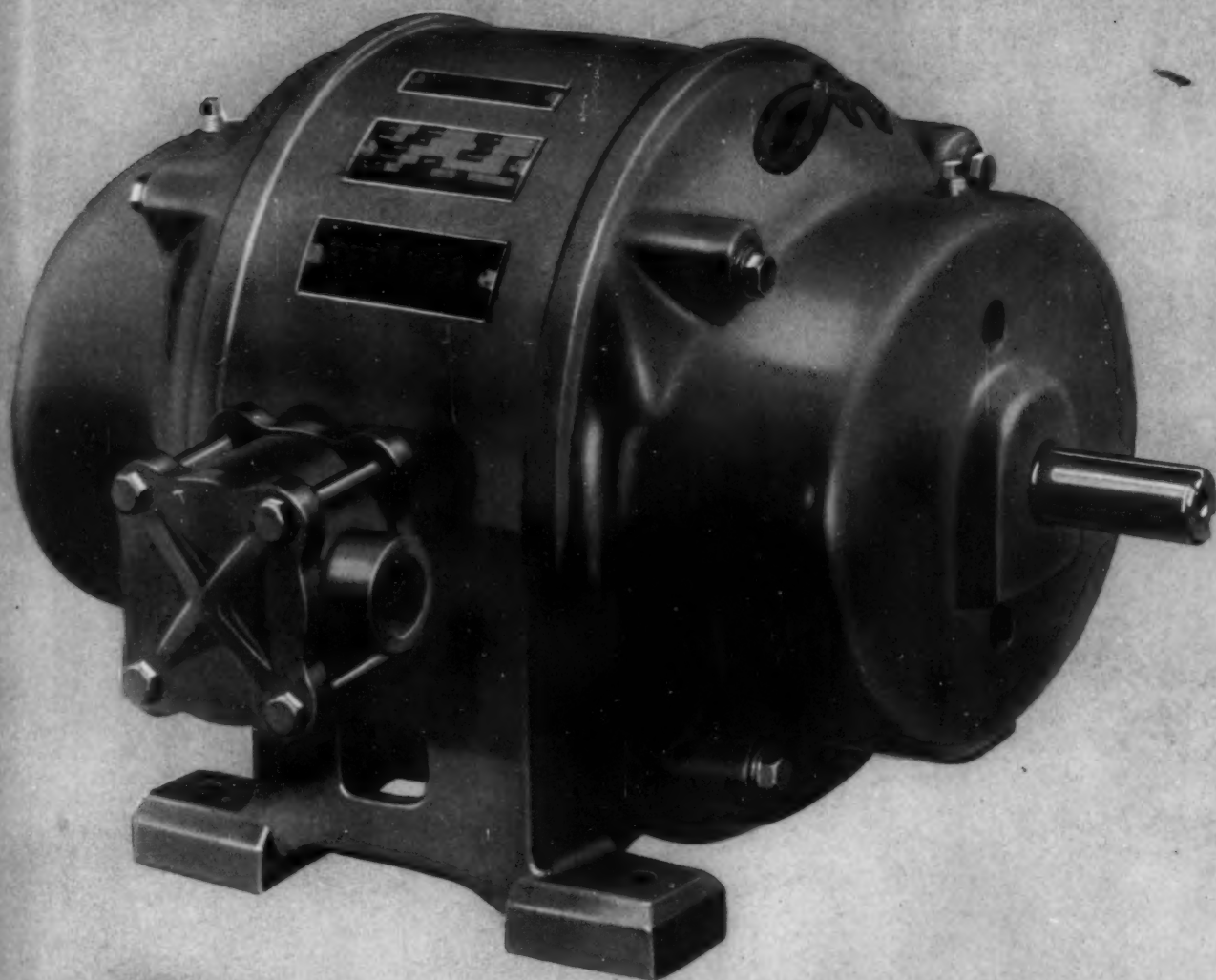
Buehler Ltd.
A PARTNERSHIP
METALLURGICAL APPARATUS
166 W. WACKER DRIVE, CHICAGO 1, ILLINOIS
TELEPHONE CENTRAL 8912

Adolph I. Buehler
222 N. LA SALLE STREET, CHICAGO 1, ILLINOIS • TELEPHONE CENTRAL 9427

**Specimen Mount Presses - Emery Paper Grinders -
Cut-Off Machines - Polishing Abrasives -
Polishing Cloths - Hand Grinders -
Belt Surfacers -**

**Metallographs - Microscopes - Magnifiers - Macro Cameras -
Titration - Stereoscopes - Dilatometers - Refractometers -
Spectrographs - Carbon Meters - Colorimeters - Pyrometers -
Hardness Testers - Dust Counters**

Adolph I. Buehler
OPTICAL INSTRUMENTS ★ METALLURGICAL APPARATUS
228 North LaSalle Street, Chicago 1, Illinois



*There is a size and
type LOUIS ALLIS
electric motor for
every industrial
requirement.*

THE LOUIS ALLIS CO., MILWAUKEE 7, WIS.

Speaking of Electric Motors—

The day of trying to use a standard motor for a special job is about over.

Machinery designers, and production managers have learned that it is much more efficient and economical to obtain a motor with exactly the electrical and mechanical characteristics required to perform a specific job than it is to try to doctor up a standard "shelf" motor to do the job.

Speed and horsepower are no longer the major measuring stick of motor requirements — they are merely incidental to the many other characteristics available in electric motors today.

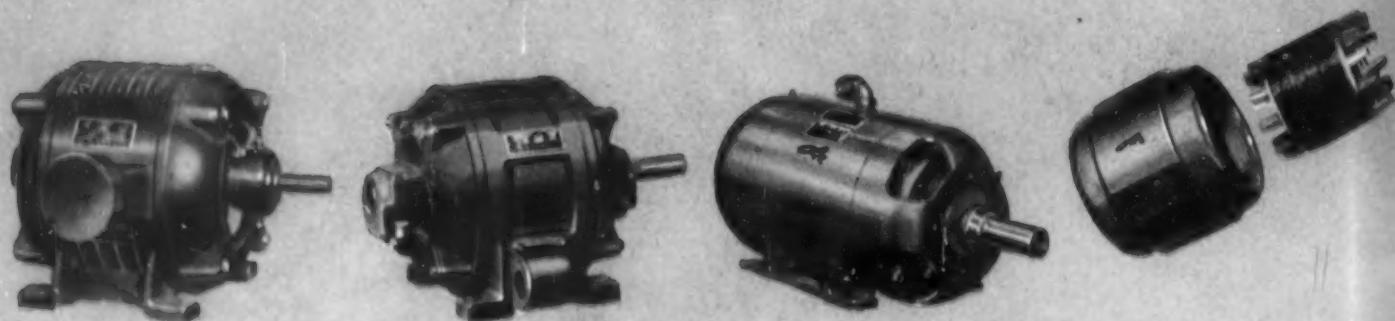
For over forty years we have been developing special motors for special jobs — our engineering department has a wealth of experience along this line —

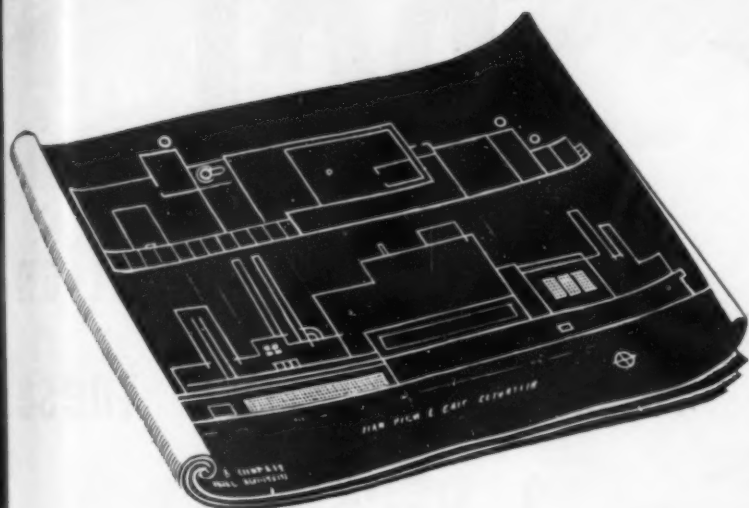
Right now special Louis Allis motors are serving a major important role in helping your boy and mine win this war — to help bring him back home — safely — and as quickly as possible.

As soon as Uncle Sam does not so urgently need all of our facilities — your electric motor problems and requirements will receive our most prompt and careful attention in every way.

But right now — let's WIN this war!

THE LOUIS ALLIS CO., MILWAUKEE 7, WIS.





In "blue-printing"
post-war expansion
consider the unique
advantages of

Tacoma

Western Center
of the Chemical Industry



Tacoma Has An Abundance of

LOW COST POWER

A high voltage inter-connecting power "grid" exists between Grand Coulee, Bonneville and Tacoma's own municipal system, giving a total present capacity of 1,204,400 kilowatts—with an ultimate capacity of 3,239,400 kilowatts. The industrial rate is only \$17.50 per kilowatt year or 2 mills per KWH.



Nearby Are Large Supplies of

RAW MATERIALS

Abundant coal, ranging from semi-anthracite to lignite, is available in Western Washington and the only coking coal on the Pacific Coast is within 30 miles. Limestone comes from Puget Sound islands ... phosphate rock from Idaho and Montana ... salt from California and Utah ... silica from Western Washington. Tacoma's water supply is known for its purity.



Washington State Has a Favorable

TAX STRUCTURE

A 40-Mill tax limitation act, passed by the state legislature, provides that taxes on real and personal property shall not exceed 40 mills in any one year on an assessed valuation of 50 percent of such property's value. There is no state income tax.



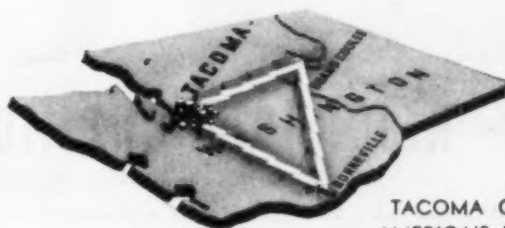
In Tacoma, Rail Facilities Meet

TIDE WATER

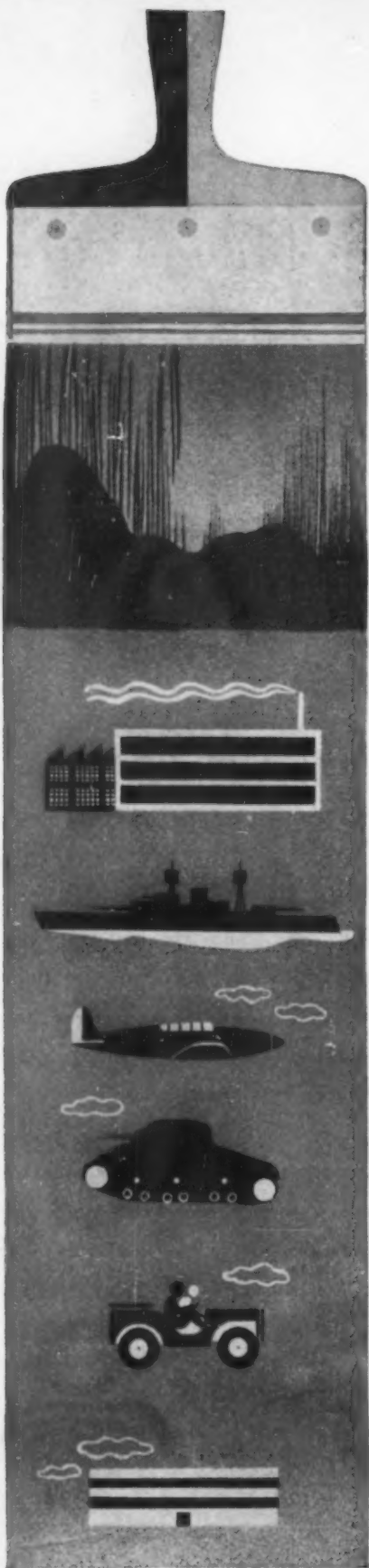
Tacoma is served by four transcontinental railroads; in peace-time by some 60 steamship lines to all parts of the world. A Municipal Belt Line railroad provides switching service without charge on line haul traffic. Tacoma's harbor is known as one of the world's finest.

GOOD REASON EXISTS for the fact that Tacoma, Washington, is being selected as a manufacturing site by an ever-expanding list of nationally-known Electro-Chemical and Electro-Metallurgical firms. Among the basic products already being produced here are metallurgical coke, charcoal, calcium carbide, chlorine, caustic soda, hydrogen, aluminum chloride, tars, sodium silicate, hydrogenated oils, ferro alloys, aluminum and copper. Some of the sound reasons for Tacoma's development in this field are listed at the left. There are many others. For full information, write the Tacoma Chamber of Commerce, Zone 1 ...

TACOMA, WASHINGTON



TACOMA OFFERS
AMERICA'S LOWEST
INDUSTRIAL POWER RATES!



RCI

simplifies specification
formulation — with these

3 BECKOSOLS

P 296 • P 350 • P 323

RCI's analysis of hundreds of government specifications establishes these three Beckosols as meeting nearly every government specification you are likely to get.

Alone or combined, these three Beckosols provide all the necessary properties and —*materially reduce your inventory.*

Moreover, these three Beckosols save you money, because they are the lowest-priced in the RCI line of alkyd resins.

Full information on the wide field of usefulness of this versatile trio, together with a list of specifications you can expect them to meet, is available on request.



REICHOLD CHEMICALS, INC.

General Offices and Main Plant, Detroit, Michigan

Other plants: Brooklyn, New York • Elizabeth, New Jersey • South San Francisco, California • Tuscaloosa, Alabama • Liverpool, England • Sydney, Australia
SYNTHETIC RESINS • CHEMICAL COLORS • INDUSTRIAL PLASTICS • INDUSTRIAL CHEMICALS • CHEMURGIC RUBBER

**LOOK HERE
FOR VALVE
SABOTEURS!**

Prevent Valve Failure *before it starts!*



SAVE VALVES... Keep War Production Moving... See that Pipe Lines are CLEAN before they are closed

Records show that every one of these valve saboteurs has been caught in a pipeline... left there during installation or repair work. All have caused crippling shutdowns... some have ruined valves beyond repair.

To guard against the constant threat of damage by these valve enemies, workmen must be taught to look into, and *through* every unit of a system before it is connected up. As a further precaution, thorough flushing or blowing out before the system is put into service is recommended.

Time lost in production slowdowns today interrupts the flow of vital war material to our fighting forces.

Slowdowns due to valve failure can be prevented, waste of critical valve metals greatly reduced, by effective valve conservation. See that your valves get frequent, systematic inspection. Repair or renew worn parts before a valve destroys itself. When valves must be replaced, have the new valves selected and installed by experienced men. Above all, train new workers to operate and maintain valves properly.

Consult Jenkins Engineers for any assistance you need in promoting valve conservation.

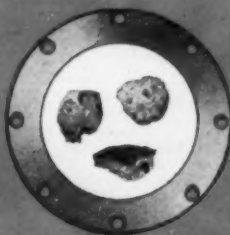
Jenkins Bros., 80 White Street, New York 13, N. Y.; Bridgeport, Atlanta; Boston; Philadelphia; Chicago. Jenkins Bros., Ltd., Montreal; London.



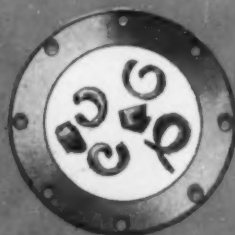
JENKINS VALVES

SINCE 1864

For every industrial, engineering, marine and power plant service... in Bronze, Iron, Cast Steel and Corrosion-Resisting Alloys... 125 to 600 lbs. pressure.



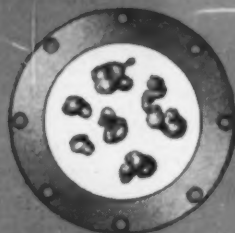
Case 1. PIPE SCALE clogs valves. *Prevention:* blow out or flush pipe thoroughly.



Case 2. PIPE CHIPS ruin valve seat. *Prevention:* Clean threads before connecting pipe.



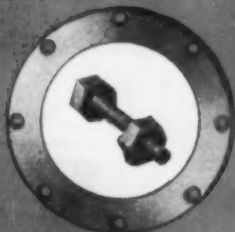
Case 3. JOINT COMPOUND clogs valves. *Prevention:* Put it on pipe threads only.



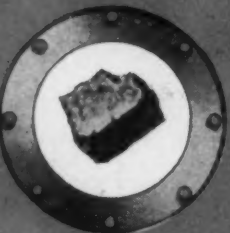
Case 4. WELDING BEADS ruin valve seat, prevent closing. *Prevention:* Blow out or flush pipe.



Case 5. NAILS jam seats in gate valve. *Prevention:* Instruct workmen to clean lines.



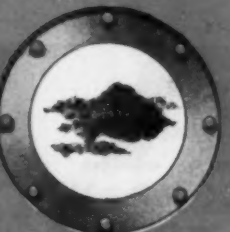
Case 6. BOLT and NUT lodge in gate valve seat. *Prevention:* Instruct workmen to be careful.



Case 7. BRICK stops flow through line. *Prevention:* Look before closing line.



Case 8. JOIST END prevents check valve closing. *Prevention:* See that new lines are clear.



Case 9. SAND and GRAVEL wear out valve parts. *Prevention:* Flush out lines.



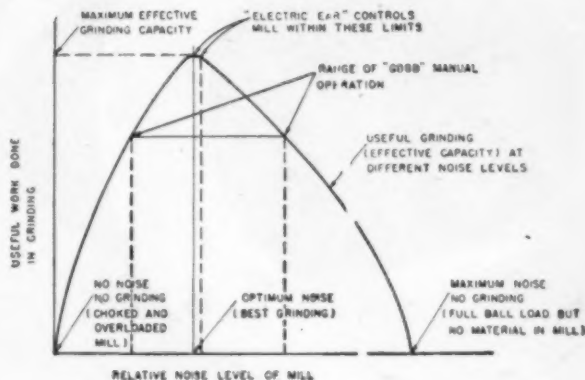
Case 10. NEWSPAPERS foul a check valve. *Prevention:* Make sure lines are clear.

THE "ELECTRIC EAR"*

Controls the rate of feed to a Ball, Pebble, Tube or Rod Mill and maintains maximum grinding capacity

The unit "listens" to the noise of the mill and maintains a uniform noise level by reducing or increasing the feed rate to compensate for changes in grinding characteristics of the material resulting from bin segregation, moisture, and hardness of the material.

The maximum grinding capacity of any mill is dependent upon a proper pulp load in the mill, which is characterized by a certain noise level. The capacity drops due to an overload or underload, therefore, it is important that the sound level be held con-

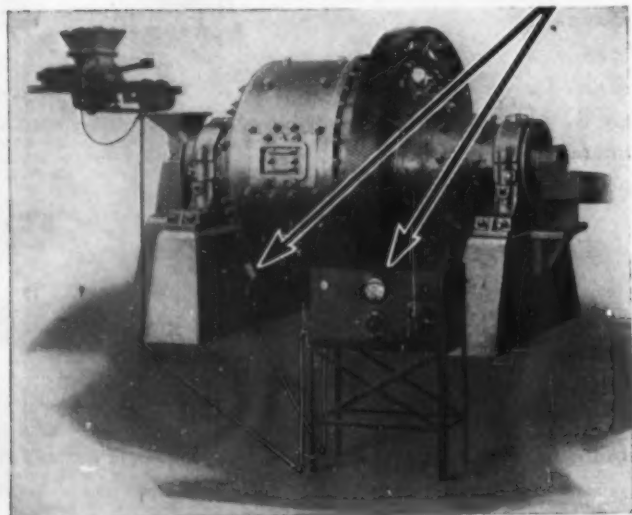


stant. In the manual control of the feed rate the operator is not able to hold this sound level in a narrow range. The graph illustrates the range of noise level (capacity) for manual operation also "Electric Ear" control.

Several hundred successful installations have shown that a 10 to 15% increase in mill capacity may be expected when the "Electric Ear" is installed.

If you are operating a Ball, Pebble, Tube or Rod Mill, write for information and bulletin 42.

* Reg. U. S. Pat. Office.



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Yes, Sir! And Mosinee Can Assure You of Uniform Weight, too, for Maximum Yardage!

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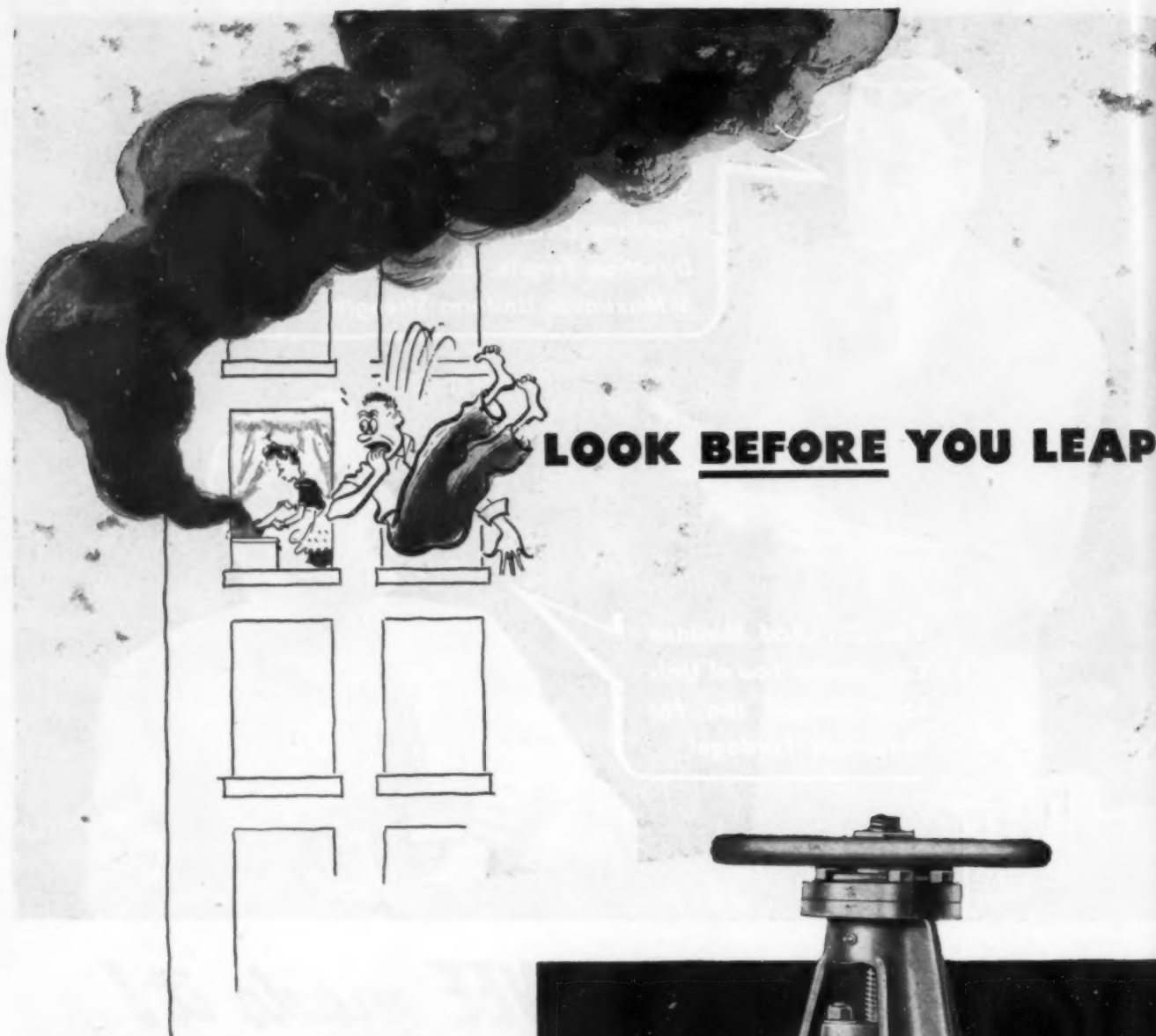
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Please address your letter "Attention Dept. C"

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Essential Paper Makers



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BEFORE YOU JUMP to any conclusion over a special valve problem...first, look to Chapman.

What may appear to be a smoke screen of doubts arising over the question of special equipment...may be cleared away quickly. Chances are good that we can supply you with the equipment you need from our Standard Line.

For much of our line has been made up, over the years, of many valves and fittings that were originally designed for special jobs. That's why today we can offer you so wide a range of types and sizes in steel, iron, and bronze alloys.

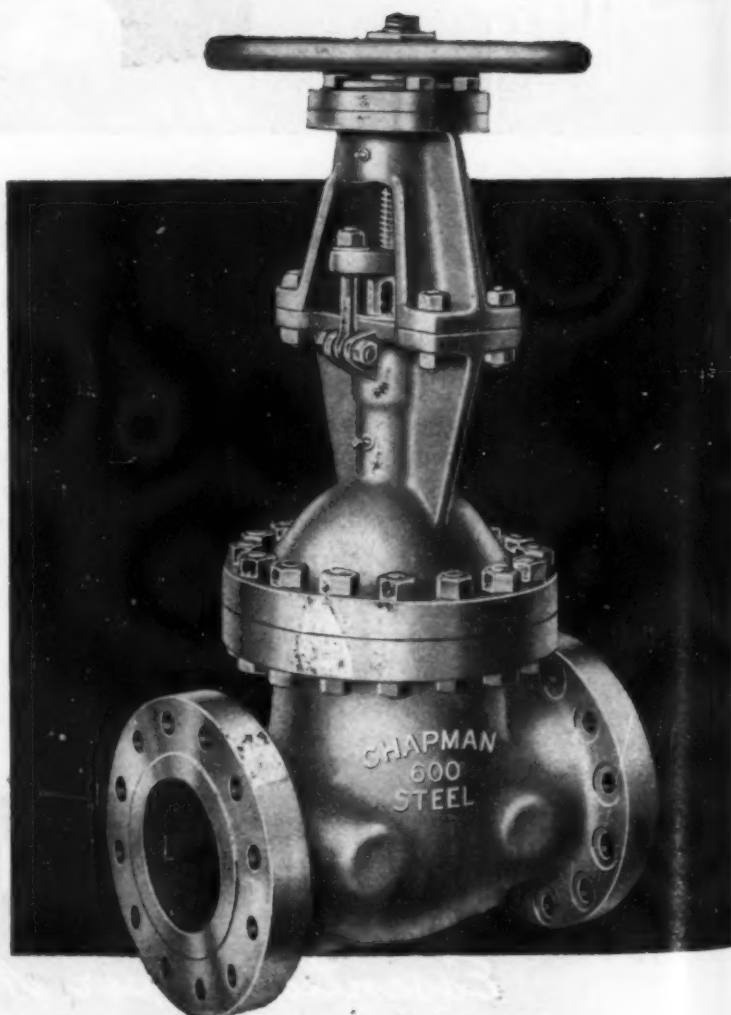
The next time trouble looms up and you need an out-of-the-ordinary valve, put a call through to us...and see your way clear with Chapman!



THE

**CHAPMAN
VALVE**

INDIAN ORCHARD, MASS., U. S. A.



NOW! GENERAL CHEMICAL OFFERS A 50% SOLUTION OF LEAD FLUOBORATE ...and at a new low price!

The widespread acceptance by platers of General Chemical Lead Fluoborate has made possible the offering of a 50% solution, and at a new low price . . . a price that will make a real difference in your lead plating costs!

Platers find this solution saves time and labor because of these extra advantages: dilutes simply with water—high concentrated strength—requires no filtering, sediment-free—a standardized composition—uniform and unvarying.

REPLACES SCARCE PLATING METALS!

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Today, Lead Fluoborate fills a vital war need in metal plating—and may offer a solution to *your* plating problem!

Write for prices and information on Lead Fluoborate Solution. Use the coupon below.



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OTHER SUCCESSFUL APPLICATIONS! To prevent corrosion by moisture, acid, salt-spray, etc., manufacturers are using General Chemical Lead Fluoborate Solution to plate battery parts, gears, nuts and bolts, and various other metal parts.

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especially drilling
with small drills...

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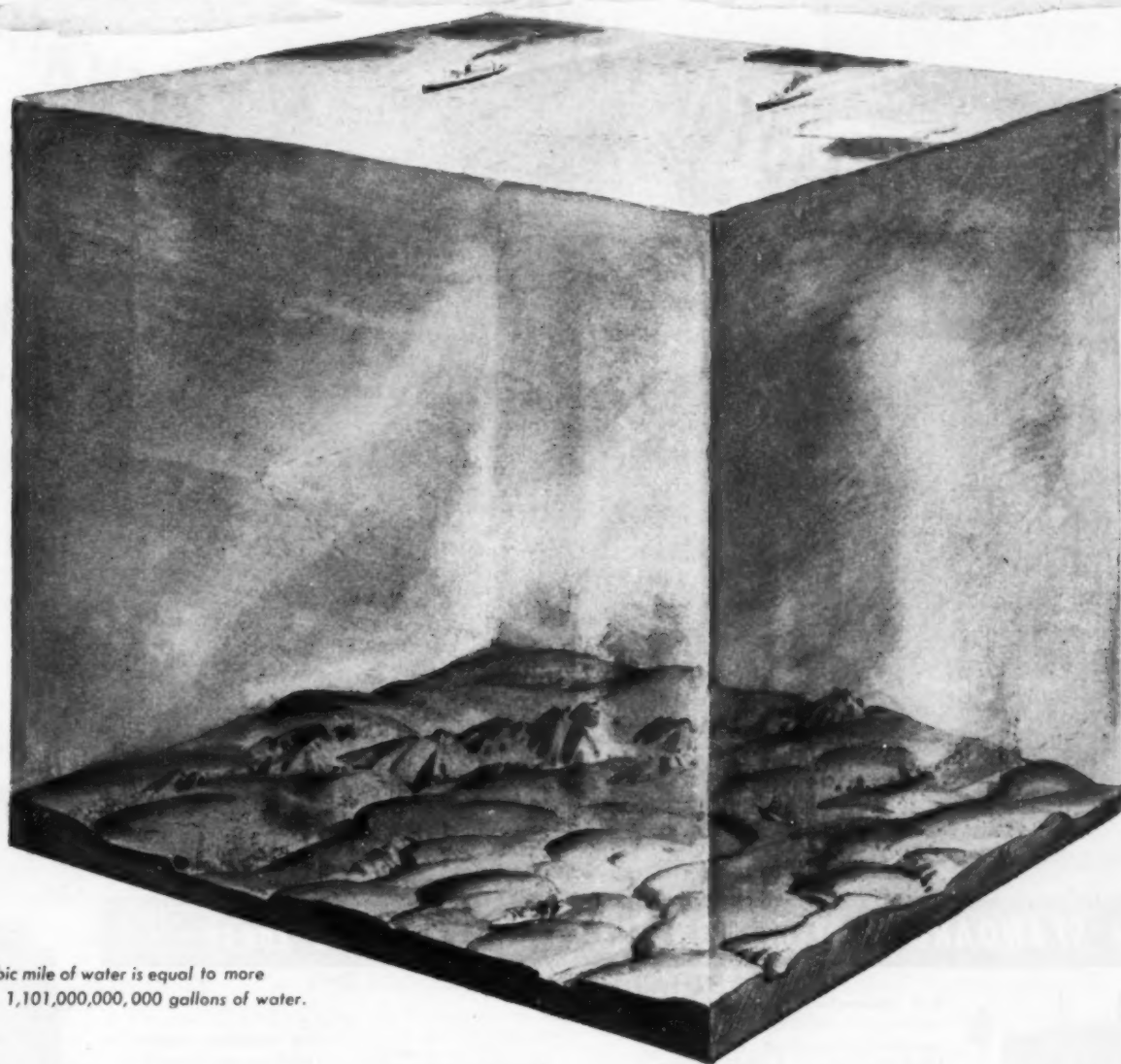
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too. So, regardless of the capacity of water you need, Peerless has a pump for the job. Peerless Pumps are made in a variety of types, with oil or water lubrication and any power drive to pump water from any depth. Literature upon request.

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CHEMICAL & METALLURGICAL ENGINEERING • DECEMBER 1943 •

FOR HAZARDOUS AREAS....101 CHOICES

ALL THESE MOTOR TYPES

	Class I, Group D*	Class II, Groups E, F, G
Polyphase, squirrel-cage	✓	✓
Polyphase, wound-rotor	✓	✓
Single-phase	✓	✓
Direct-current	✓	✓
Gear-motors	✓	✓**
Brake-motors	✓	✓
Vertical motors	✓	✓
Multispeed motors	✓	✓
Navy motors ***	✓	✓
Marine motors	✓	✓

Tested and listed by Underwriters' Laboratories, Inc.
*Limited sizes also available for Class I, Group C.
**Not applicable to Class II, Group G.
***Also explosion-tested by other Laboratories.

ALL THESE MODIFICATIONS

	Class I, Group D	Class II, Groups E, F, G
Face-type end shields	✓	✓
Flange-type end shields	✓	✓
Footless frames	✓	✓
Hollow-shaft designs	✓	✓
Thrust bearings	✓	✓
Oil-lubricated ball bearings	✓	✓
Sleeve bearings (250 hp up)	✓	✓**
Class B (high-temperature) in- sulation	✓	✓
Various voltages (32-6600 volts)	✓	✓
Various frequencies (25-60 cycles)	✓	✓
Intermittent ratings	✓	✓
Special-duty	✓	✓

In STANDARD MOTOR CONSTRUCTIONS such as these —



G-E squirrel-cage motor with face-type end shield for close-coupled mounting. Listed by Underwriters' Laboratories, Inc., as suitable for Class II locations.

G-E squirrel-cage gear-motor in explosion-proof construction, arranged for ceiling mounting. For low-speed conveyor drives, etc., in chemical plants.



G-E vertical motor (hollow shaft with flange base) for Class I, Group D, locations. Used for pumping gasoline from underground tanks.



NAME YOUR HAZARD—TELL US YOUR SPECIAL DRIVE PROBLEM—The chances are that G.E. can meet your *combination* of requirements with standard or "modified-standard" motors listed by Underwriters' Laboratories, Inc., as suitable for specific hazardous locations. If you need a motor for war work in any sort of hazardous spot, just call our local office. *General Electric Co., Schenectady, N. Y.*

The best investment in the world is in this country's future—BUY WAR BONDS

GENERAL ELECTRIC

**EXPLOSION-PROOF
MOTORS**

DARCOVA PUMPCUPS



Unique principle saves up to \$100 every year for thousands of pump users

WHATEVER you pump—water, oil, gas, steam, alkalies, acids, or other liquids—Darcova can save you time and save you money.

Darcova is the original composition valve cup, proved by 35 years of service. As applied to pumps, it is known as the Darcova Pumcup. Darcova Pumcups are readily applied to any reciprocating pump by means of a simple, inexpensive adapter piston, illustrated above.

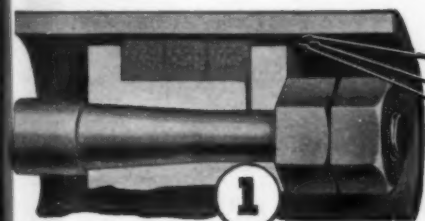
By employing the simple cup principle, Darcova increases pump capacity and pumping efficiency. On the pumping stroke, fluid pressure against the inside of the cup forces the sidewall out against the liner, creating a tight seal that prevents slippage past the piston. This tight seal also prevents lodgment of dirt or abrasive particles between cup and liner, and so reduces scoring and wear.

Just compare this efficient action with that of ordinary pump packing. And remember, too, that Darcova's unique composition stands up—not only against the frictional wear of millions of pump strokes, but against chemical action of all kinds, too.

No wonder thousands of Darcova customers are experiencing up to \$100 saving per pump per year.

Let Us Survey Your Needs, FREE

Darcova Field Engineers can help you get more for your pumping dollar—just as they are helping others. Phone, wire or write us—or ask your supply store or industrial distributor—about the FREE Darcova Survey Plan and Service.



PUMP PISTON MOTION →

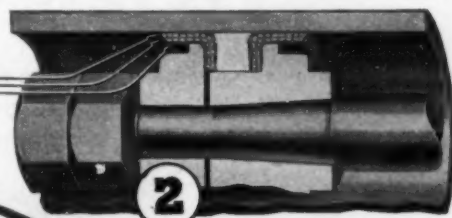
1 THE OLD WAY

From the minute ordinary packing is installed in your pumps, it begins to wear. Each piston stroke means increased clearance between packing and liner. Added clearance means more slippage—and more loss of efficiency—until finally efficiency drops so low that the pump must be repacked. Note also that friction load is the same on both load and return strokes.

AS WEAR TAKES PLACE FLUID "SLIPPAGE" INCREASES

2 THE DARCOVA WAY

With Darcova Pumcups, the cup principle insures constant pumping efficiency. Fluid pressure keeps the Pumcup sidewall in close contact with the liner, regardless of wear. There is minimum slippage. Furthermore, on change of stroke, pressure inside the Pumcup is released and load on return stroke reduced. This means fewer shutdowns and many hours of longer service.



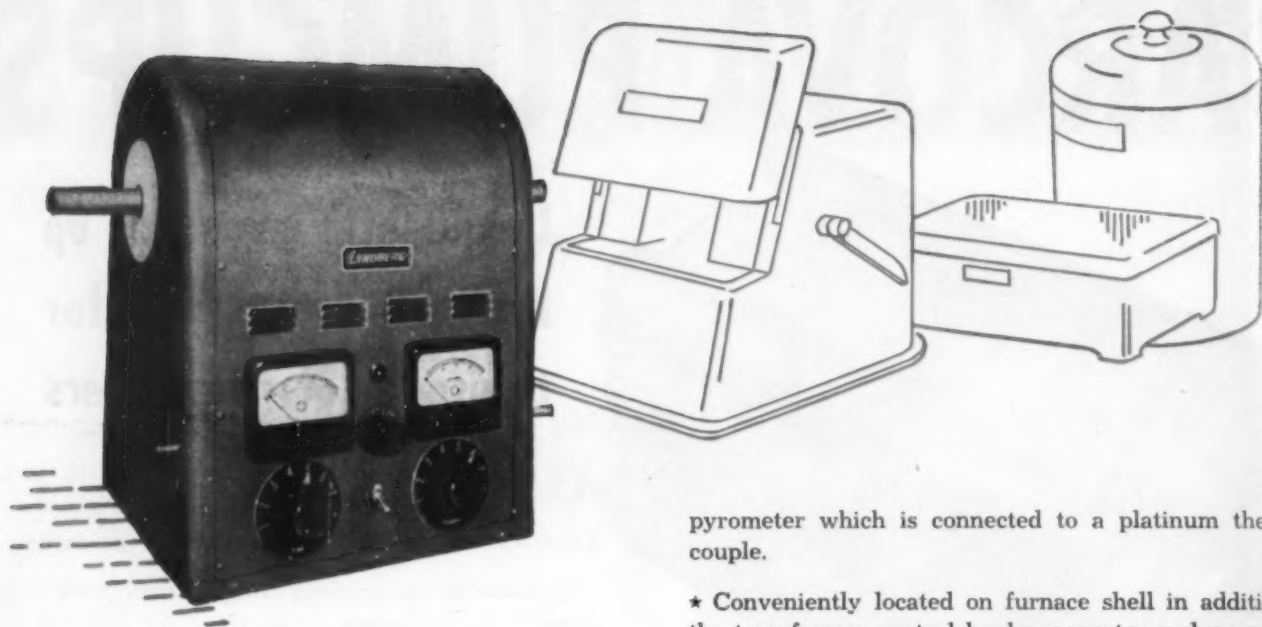
← PUMP PISTON MOTION

REGARDLESS OF WEAR FLUID PRESSURE KEEPS PUMPCUP WALL AGAINST CYLINDER



DARLING VALVE & MANUFACTURING CO.

WILLIAMSPORT, PA.



Dependability IN YOUR LABORATORY!

THE NEW LINDBERG LABORATORY FURNACES AND HOT PLATES are engineered for dependable performance and built for long life. In addition, they are designed to add to the high standard of present day laboratory cleanliness. Even the most fastidious technician will appreciate the modern streamlined appearance Lindberg equipment presents.

Pictured above is the Lindberg Combustion Tube Furnace. Let's glance over the many important features you can benefit by in your laboratory.

- ★ Because of the high temperatures obtainable, this furnace is ideal for fast modern volumetric methods of carbon or sulphur determination as well as gravimetric determination on carbon and all alloy steels, including stainless and heat resisting steels.

- ★ Three low voltage, high temperature Globar elements permit continuous operation with temperatures up to 2500°F. or for occasional operation to 2650°F. Heating elements are easily accessible—no inconvenient dismantling and assembling job required to replace them. Temperature is regulated by a built-in variable voltage transformer with coarse or fine adjustment for amperage control. Adjustment is made by merely making the necessary settings with the amperage control knobs.

- ★ An ammeter is provided to show the proper and safe current required for the Globar heating elements. The temperature in the combustion zone is indicated by a

pyrometer which is connected to a platinum thermocouple.

- ★ Conveniently located on furnace shell in addition to the transformer control knobs, ammeter and pyrometer are a pilot light which shows when furnace is in operation; an on and off switch; and adjusting knob for controlling oxygen flow through a needle valve and rubber tubing adapters connected to the needle valve.

- ★ Furnace is equipped with adapters for easy interchangeability of tubes. Three sizes of tubes, 1", 1¼", and 1½" O.D. can be adapted, while fourth tube, 2" O.D. can be used without adapters.

- ★ For 60 cycle, AC current with voltage at either 110 or 220 volts. Furnaces for 25 cycle operation can also be supplied.

See your dealer today. He will be pleased to go over your requirements and point out the advantages you get with the new Lindberg Combustion Tube Furnaces, Box Furnaces, Crucible Furnaces and the new laboratory Hot Plates.

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In the electrochemical industry

In the electrochemical field, Ignitron Rectifiers have met admirably the extremely severe conditions of continuous operation at full capacity. Applications in this industry continue to increase.

Outstanding advantages of the Ignitron are its high efficiency and ability to handle full load continuously over long periods.

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IGNITRON RECTIFIERS



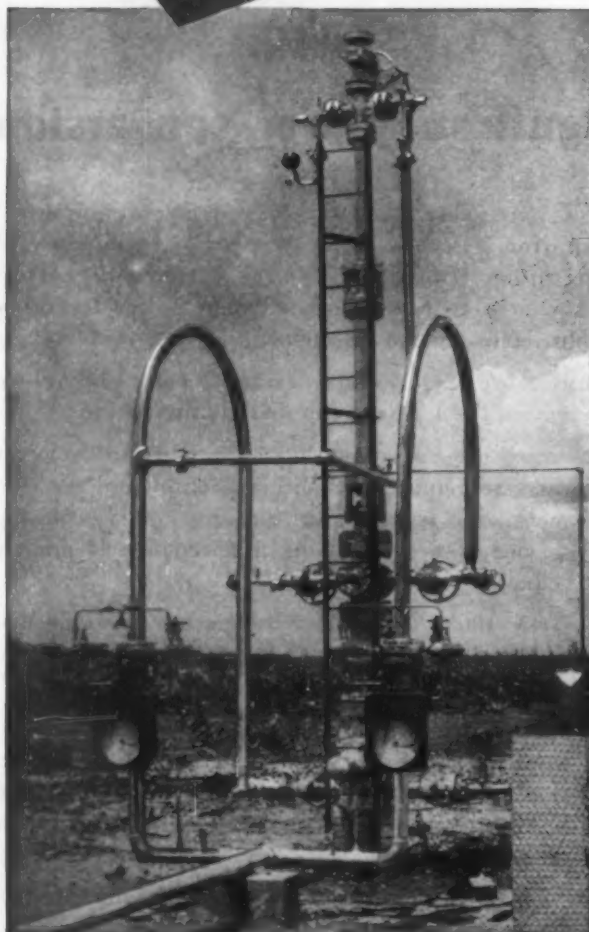
PLANTS IN 25 CITIES
OFFICES EVERYWHERE

Westinghouse

Electronics at Work



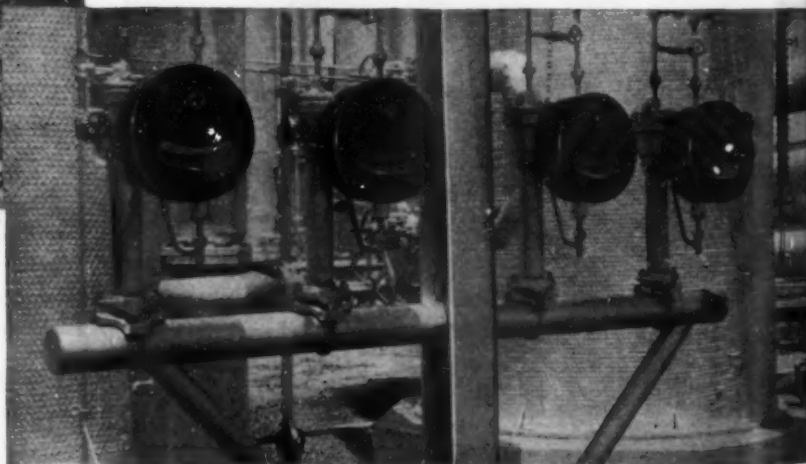
All 9 Lives!



Metric-American orifice meters installed near well head.



Right... A group of Metric-American indicating flowmeters.



MAINTENANCE IS A SIMPLE MATTER—if and when it is necessary for a Metric-American meter. Continuous engineering development has reduced its construction to the fewest number of parts practicable.

For example, there is only one moving part between mercury surface and chart record. (Our sylphon-actuated orifice meter, with spring-loaded bellows replacing the usual mercury manometer, is applicable where mercury use is inadvisable.)

Ruggedness of construction throughout, eliminates any great problem of keeping Metric-American meters fit. Connections between chambers of the differential gage body are both screwed and welded. . . . No detail is overlooked.

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AMERICAN
METER COMPANY
INCORPORATED (ESTABLISHED 1936)

SCAIFE

dependable containers for:

sulphur dioxide

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methyl bromide

freon-12

propane

butane

as well as other liquids, air and gases

Meeting code and I.C.C. specifications, Scaife Cylinders provide reliable containers of liquids and gases.

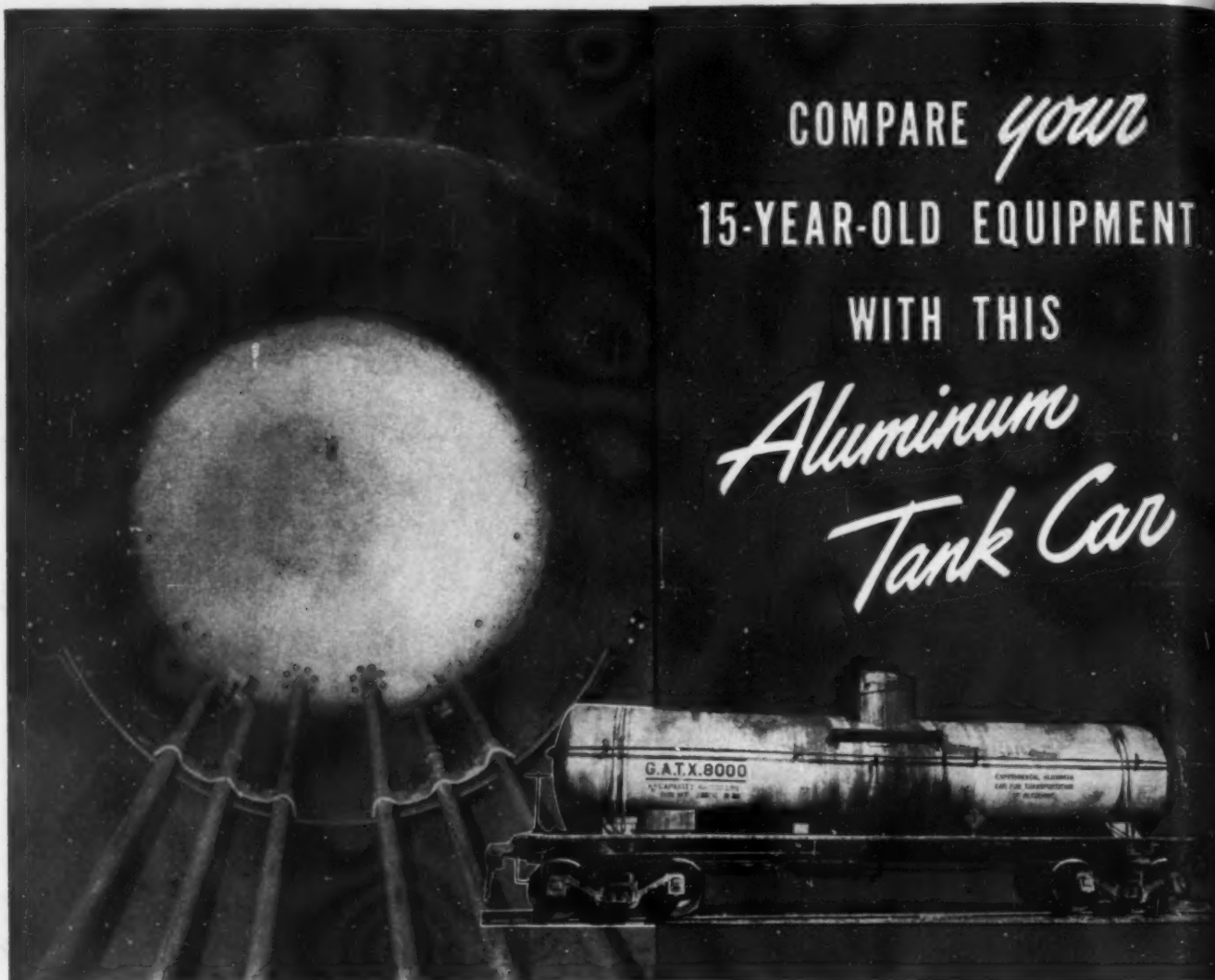
Many years of engineering and manufacturing experience are reflected in the design and construction of these high quality cylinders.

The uniform thickness of the rolled shell, the full-strength heads and reinforced shoulders, all contribute to long life and satisfactory service. They are pleasing in appearance, sturdy and dependable.

Write for full information on these Scaife Cylinders.

SCAIFE COMPANY

General Offices, Laboratories and Works, OAKMONT (Pittsburgh District), Pa.
Representatives in Principal Cities



This is an unretouched photograph

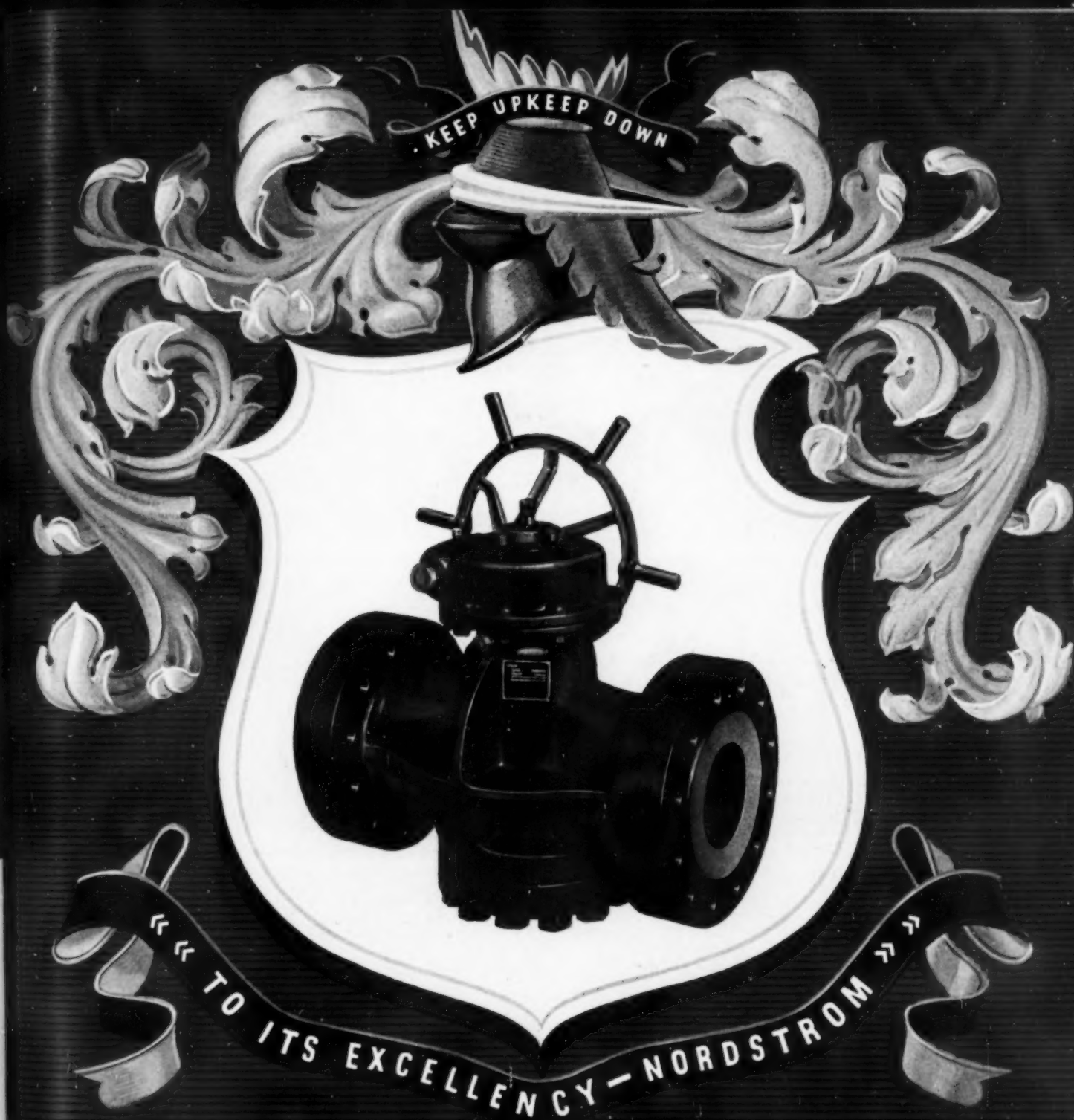
Note the excellent condition of this 15-year-old aluminum tank and piping. Does your equipment look like that after fifteen years?

Evidence like the above proves that, where alloys are selected with an eye on materials to be handled, aluminum provides the protection needed to resist corrosive attack. More than 300 aluminum tank cars, and thousands of pieces of aluminum processing equipment, have proved that point. There's no rusting to destroy the tank or damage its lading; there's no necessity for expensive linings that may require frequent replacements.

"Cut operating costs", is certain to be management's demand, as you formulate postwar plans. A liberal use of aluminum alloys in processing equipment, for storage tanks and shipping containers, seems to offer one means of meeting that requirement, after looking at the interior of this 15-year-old aluminum tank car.

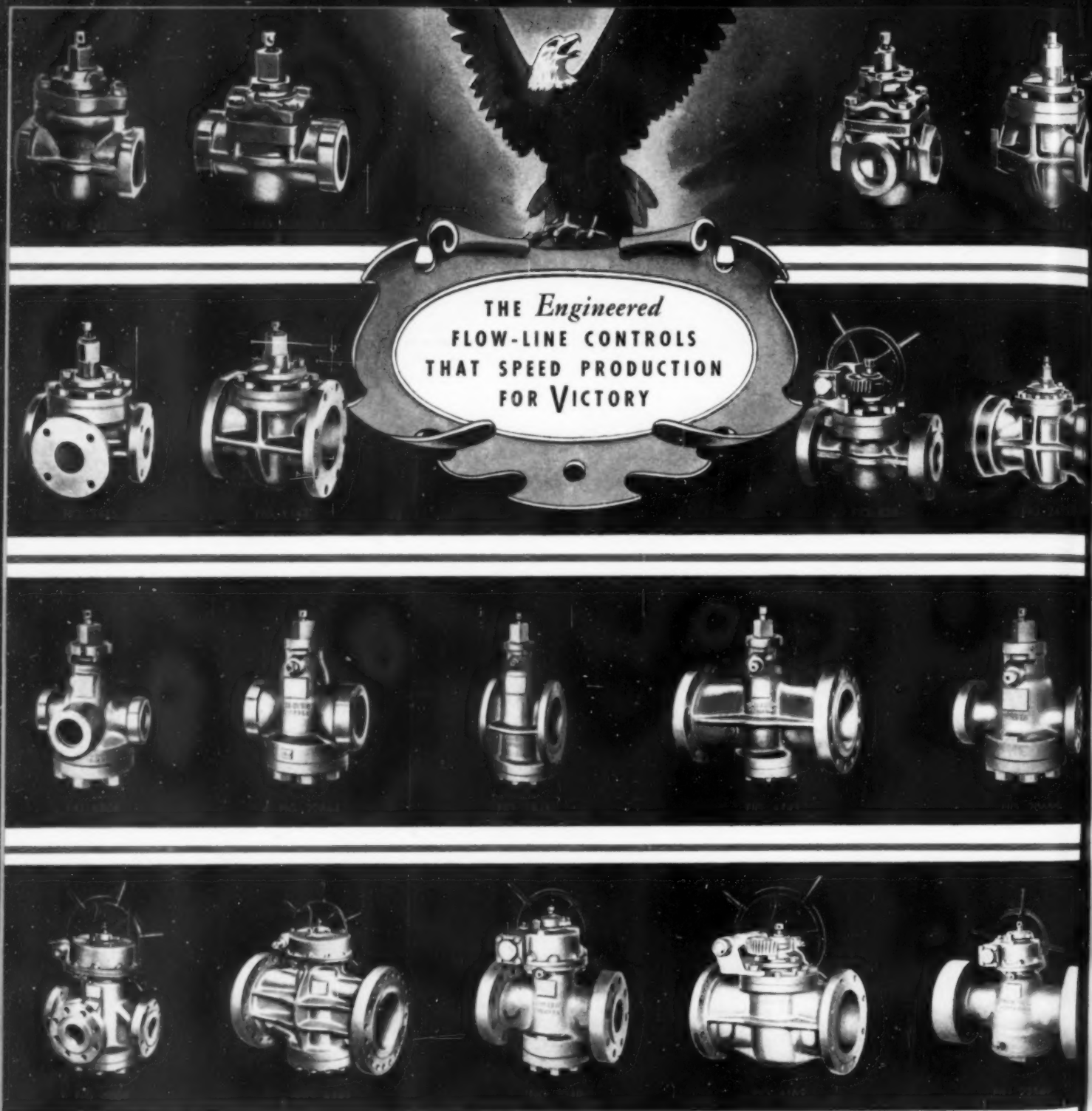
Alcoa engineers will gladly help your designers consider the use of aluminum in planning your postwar equipment. ALUMINUM COMPANY OF AMERICA, 2151 Gulf Building, Pittsburgh, Pennsylvania.

ALCOA  **ALUMINUM**



FIRST *Choice in Critical Industries*

- FIRST** choice for controlling vital flow lines in U.S. Government fuel dumps.
- FIRST** choice for drastic line service in synthetic rubber producing plants.
- FIRST** choice for conquering abrasion in mud lines for rotary oil well drilling.
- FIRST** choice in chemical plants for handling corrosive and erosive liquids and slurries.
- FIRST** choice in petroleum refineries for handling high temperature hydrocarbons.
- FIRST** choice on pipe lines for complete safety in handling oil, gas and gasoline.



THE *Engineered*
FLOW-LINE CONTROLS
THAT SPEED PRODUCTION
FOR VICTORY

Nordstrom

LUBRICATED VALVES

Sealdport Lubrication

MERCO NORDSTROM VALVE COMPANY — *A Subsidiary of Pittsburgh Equitable Meter Company*
WORLD'S LARGEST MANUFACTURERS OF LUBRICATED PLUG VALVES; GASOLINE, OIL & GREASE METERS

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SOUTH AMERICAN Representative: The Armco International Corporation. *Main Office:* Middletown, Ohio

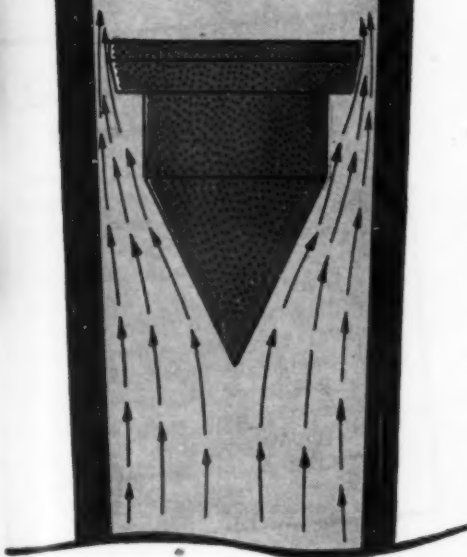
PRODUCTS: Nordstrom Lubricated Valves; Air, Curb and Meter Cocks • Nordco Valve Lubricants • EMCO Gas Meters • EMCO-McGaughy Integrators
EMCO Regulators • Pittsburgh-National Meters for Gasoline, Grease, Oil, Water and other Liquids • Stupakoff Bottom Hole Gauges

The ROTAMETER

—its basic advantages over head-type meters

8 BASIC ADVANTAGES

1. Metering elements and fluid being metered clearly visible
2. Wide flow range—20-to-1 easily obtained
3. Evenly spaced scale divisions—no compression of scale at low flows
4. Low, constant pressure drop—reduces pumping costs
5. New Stahl-Vis rotameter compensates for viscosity and density variations
6. 10" to 24" travel of metering float—accuracies correspondingly high
7. Instantaneous response to flow change—no friction or hysteresis
8. Measures corrosive gases, liquids and slurries that no other meter will handle accurately



Are you trying to cut power costs? Are you seeking stable process conditions? Do you sometimes operate with precious little available head? Silly questions! Of course, you do, and therefore we would like you to consider the

Low and constant pressure drop

of the rotameter. As the rotameter float rises, the area for flow passage increases so that the flow never has a fixed constriction thru which to force its way.

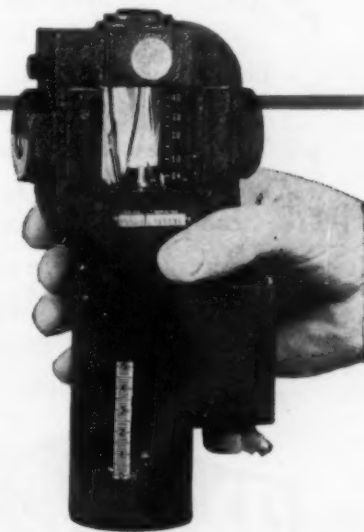
The pressure drop across the float is low and constant throughout the entire flow range of the rotameter.

Consequently in many plants Fischer & Porter Rotameters are definitely paying their way thru lowered pumping costs, and doing their gentle bit to keep touchy processes quietly soothed by a minimum of pressure fluctuations. Often they are the only meters that may be used because of the low total pressure available.

Do you know all the advantages that are making Fischer & Porter Rotameters the flow rate measuring instrument? Our new booklet, "A New Era in Flow Rate Measurement," will tell you why. It's very comprehensive yet "awfully" easy to read because it's done in a semi-humorous, "catch-as-catch-can" cartoon style which we hope will appeal to you. It's free, so why not send for it?

NEW FLOW ALARM . . . positive . . . inexpensive

The float in the Rota-Sight alarm moves up or down in direct proportion to flow rate changes. At any points you may choose in the flow range it will operate an electrical switch to light an alarm lamp, to sound an alarm, or to stop or start electrical equipment. Positive . . . accurate . . . dependable. Cast in all metals from $\frac{1}{4}$ " size and up. Available also without the alarm attachment as a flow rate indicator. Send for bulletin 92-A which gives the interesting details.



FISCHER & PORTER CO.

1812 COUNTY LINE ROAD, HATBORO, PA.

FLOW RATE INDICATING, RECORDING OR CONTROLLING ROTAMETERS FOR ANY LIQUID OR GAS

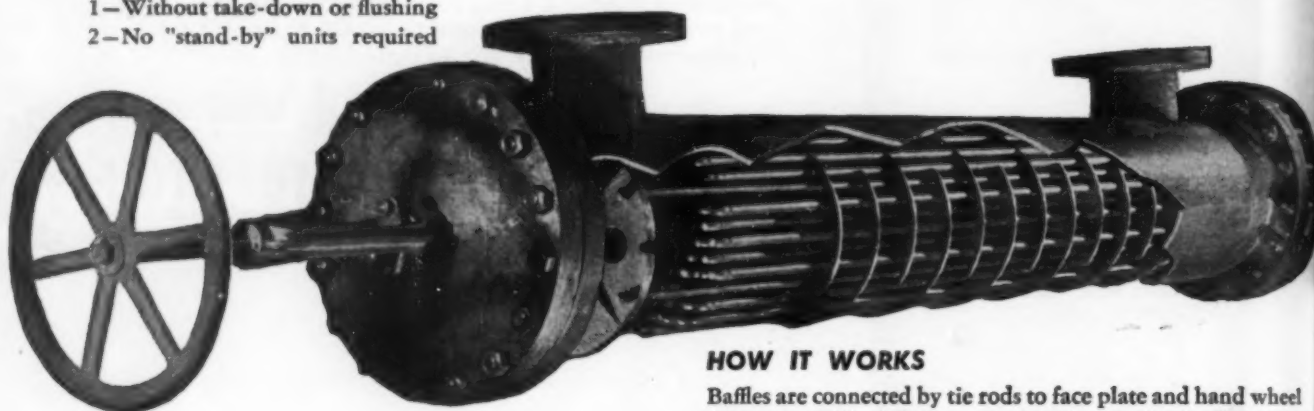
CHEMICAL & METALLURGICAL ENGINEERING • DECEMBER 1943 •

A FEW TURNS and it's *clean*

Paracoil
SELF-CLEANING
TUBULAR HEAT EXCHANGER

CONTINUOUS OPERATION

- 1—Without take-down or flushing
- 2—No "stand-by" units required



HOW IT WORKS

Baffles are connected by tie rods to face plate and hand wheel (shown at left). A few turns of the hand wheel, while heat exchanger is in operation, moves baffles along transfer tubes, restoring the surface in contact with the medium being heated or cooled to its original clean condition.

U. S. Patent No. 1826747

Other patents applied for

Check these advantages

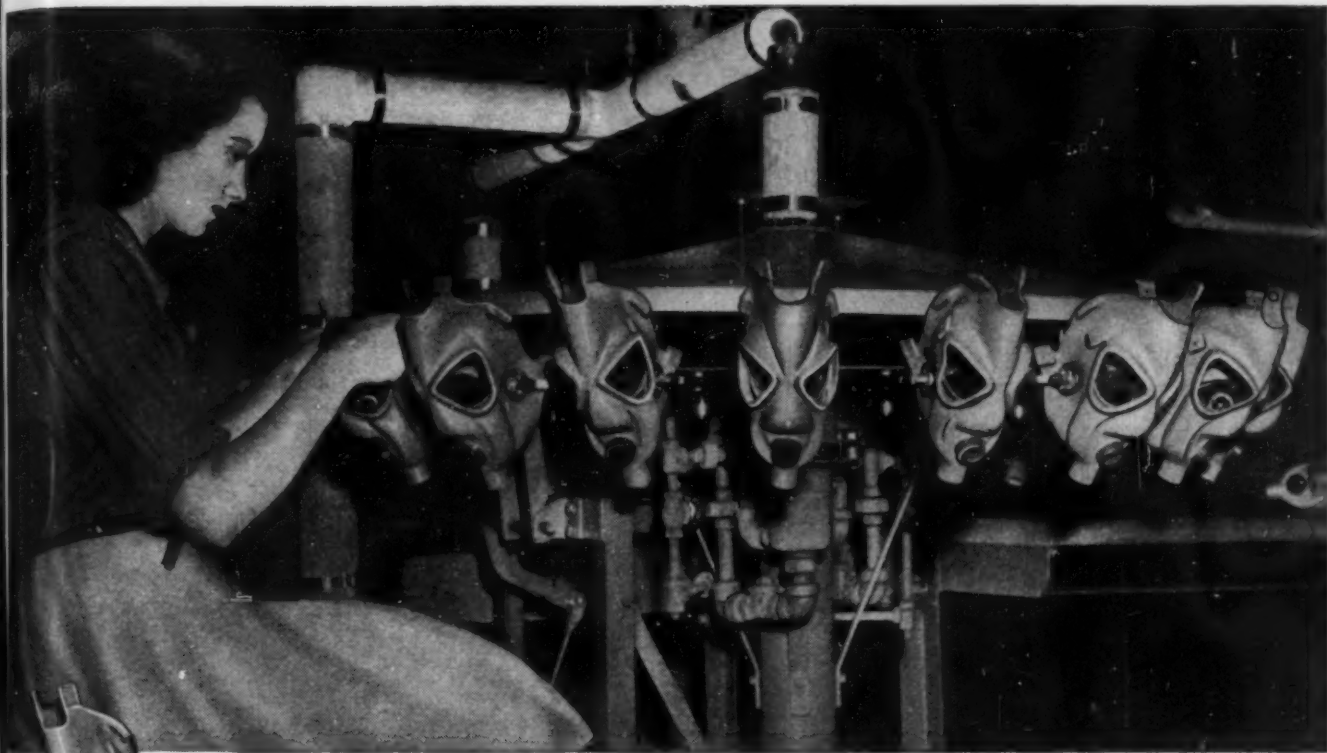
- ✓ Specially designed for heat transfer in processes where continuous operation is important.
- ✓ Eliminates take-down for manual cleaning, or necessity for flushing with solvent—both costly in time and labor.
- ✓ Takes less than a minute to clean, while unit is in operation.
- ✓ Eliminates necessity for extra "stand-by" heat exchangers on continuous-operation processes.
- ✓ Reduces maintenance cost to a negligible factor.
- ✓ Insures continuous maximum heat transfer efficiency.
- ✓ Wide application wherever heat exchangers are required for heating or cooling.

To the Chemical and Process Industries

Paracoil has pioneered in the development of heat transfer equipment for 28 years. There are countless applications for Paracoil Heat Transfer Equipment in the chemical and process industries... and whether you are working on present or postwar problems of heating and cooling, you are invited to make use of Paracoil Engineering Service for their solution. A discussion involves no obligation. Write us about your heat transfer problems.



DAVIS ENGINEERING CORPORATION
1058 EAST GRAND STREET, ELIZABETH 4, NEW JERSEY



Making Faces

AT THE AXIS!

THESE awesome-looking gas masks typify the infinite variety of material needed to round out America's war program.

Whether in the mass production of gas masks or guns, planes or tanks, ships and shells, management is finding a quick solution to many of its mass production problems through Texaco Engineering Service and

Texaco Products.

Preferred in many fields, Texaco performance can definitely increase production in *your* plant.

A Texaco Lubrication Engineer is freely at your service through more than 2300 wholesale distributing points in the 48 States.

The Texas Company, 135 East 42nd Street, New York 17, N. Y.

THEY PREFER TEXACO

★More buses, more bus lines and more bus-miles are lubricated with Texaco than with any other brand.

★More stationary Diesel horsepower in the U. S. is lubricated with Texaco than with any other brand.

★More Diesel horsepower on streamlined trains in the U. S. is lubricated with Texaco than with all other brands combined.

★More locomotives and railroad cars in the U. S. are lubricated with Texaco than with any other brand.

★More revenue airline miles in the U. S. are flown with Texaco than with any other brand.

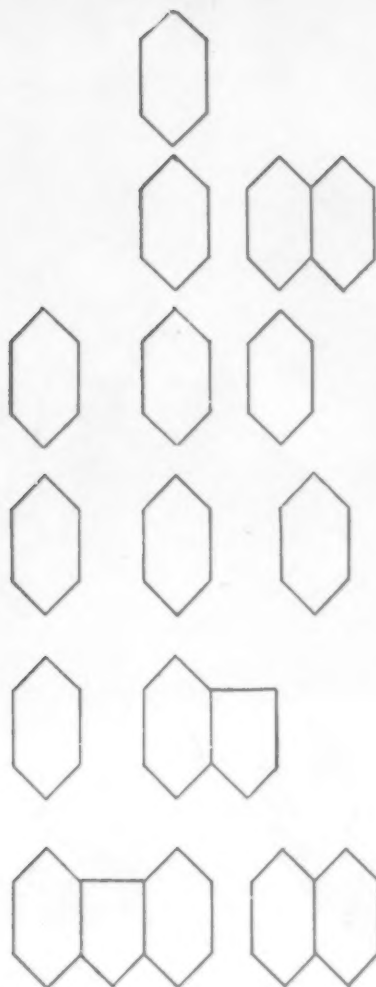


TEXACO Lubricants, Fuels and Engineering Service

TUNE IN FRED ALLEN EVERY SUNDAY NIGHT—CBS ★ HELP WIN THE WAR BY RETURNING EMPTY DRUMS PROMPTLY

CHEMICAL & METALLURGICAL ENGINEERING • DECEMBER 1943 •

The chemicals
that were
"discovered"
at a
convention



Four years ago, at the Exposition of Chemical Industries, we put up a trial balloon.

We exhibited a list of 34 chemicals from coal. Some of them were well known commercial chemicals. But others on this list had no sizable known commercial uses. Their general physical and chemical properties were known, but commercially speaking, they were "orphans."

We frankly said *that* about them four years ago; but we also pointed out that the organic chemical industry was growing by leaps and bounds, that it needed things it had never needed before, that other chemicals derived from coal had proven important raw materials for the chemical industry, and that perhaps one of the "orphans" in the Koppers' booth might be exactly the thing for which some chemist was cudgeling his brains.

Since then we have sent out literally thousands of samples of those chemicals. We have worked with many

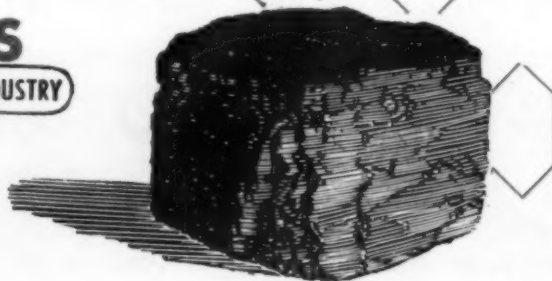
men who saw some promise in them.

Today, several of them are in commercial production and new plants have been built to recover them.

In early December, this year, the current Exposition of the Chemical Industries is being held. Koppers will be there again to discuss possible applications of coal tar products. (There are over two hundred identified chemical compounds in coal tar and possibly many more not yet identified.) Who knows what stories may be told four years from now about coal tar chemicals which have no known use now?

Koppers is already serving the chemical industry by producing phenol, cresol, xylenol, pyridine, quinoline and other tar bases, naphthalene, light oil products, ammonium thiocyanate, refined tars, industrial pitches and many other products.—Koppers Company and Affiliates, Pittsburgh, Pa.

KOPPERS
THE INDUSTRY THAT SERVES ALL INDUSTRY





THE SEED FROM WHICH ALL INDUSTRY GROWS

CHEMISTRY, the seed from which all industry grows, has written our world's history... It will record our future. Under the stimulus of war's insatiable demands for technical discovery and inventions, chemistry has revolutionized some of our basic industries. Most of these discoveries are common knowledge among normal rivals for the duration. But when the war ends, these new techniques will become the weapons of wide-open competition—under Free Private Enterprise.

The opportunity is definite. Products and processes, known or secret, are past the experimental stage. Research now aims at their development. This means planning and competent engineering. J. F. Pritchard & Company can help you.

J. F. Pritchard & Company engineers are experienced in the various unit operations of chemical engineering such as heat transfer, evaporation, distillation, gas absorption and extraction. These operations can be skillfully designed, from pilot plant through full scale operation. They can be coordinated to produce an efficient and flexible plant for the dehydration of gasses, production of alcohol, synthetics, processing of foods and the production of chemicals from petroleum.

J. F. PRITCHARD & COMPANY, *Chemical Division*, Fidelity Building
Kansas City, Missouri

Pritchard
KANSAS CITY
TULSA
CHICAGO
HOUSTON
NEW YORK
PITTSBURGH
ENGINEERS AND CONSTRUCTORS
FOR THE CHEMICAL • PETROLEUM • GAS AND POWER INDUSTRIES
Manufacturers of Mechanical and Atmospheric Cooling Towers



"Long Life" "Low Maintenance"
"High Efficiency" "No Clogging"

... most important★ advantages of Buell Dust Recovery Systems

★ A recent survey among Buell users—companies that have had their Buell Dust Recovery Systems in operation for three, four, five, or more years—brought to light a remarkable record for long life and trouble-free performance, freedom from clogging and absence of repairs.

The high efficiency and other *plus* advantages of Buell Dust Recovery Systems are the result of Buell's exclusive van Tongeren design. The van Tongeren "shave-off," for instance, makes possible a high recovery efficiency without resort to small-diameter cyclones. At the same time, the large diameter of Buell cyclones permits construction of extra-heavy

metal and reduces abrasive wear—two important factors in the proved long life and low maintenance cost of Buell equipment.

In addition, large diameters permit Buell cyclones to be designed with large outlet openings that virtually eliminate clogging and do away with the necessity for constant supervision and attention.

Buell Dust Recovery Systems are used for the reclamation of valuable dusts and the abatement of hazardous dust nuisances by leading companies in every branch of industry.

Write for factual, 28-page book,
Bulletin G-482.

BUELL ENGINEERING COMPANY, INC.
18 Cedar Street, New York 5, N. Y.
Sales Representatives in Principal Cities



*A partial list of
well-known Buell users*

- AMERICAN POTASH & CHEMICAL CORP.
- BETHLEHEM STEEL CO.
- BUICK MOTOR CAR COMPANY
- THE CONNECTICUT LIGHT & POWER CO.
- CONTINENTAL BAKING CO.
- CURTISS-WRIGHT CORP.
- THE DETROIT EDISON CO.
- DEWEY PORTLAND CEMENT CO.
- THE DOW CHEMICAL CO.
- E. I. DU PONT DE NEMOURS & CO., INC.
- EASTMAN KODAK CO.
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- LEHIGH PORTLAND CEMENT CO., INC.
- MONSANTO CHEMICAL CO.
- NESTLE'S MILK PRODUCTS, INC.
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- REYNOLDS METALS CO.
- SHELL OIL COMPANY
- SOCONY-VACUUM OIL CO.
- WEST VIRGINIA PULP & PAPER CO.

BUY WAR BONDS AND MAKE THE AXIS BITE THE DUST

Processing Corrosive Chemicals?

**HERE'S HOW
LAPP PORCELAIN
CAN IMPROVE PURITY,
INCREASE SECURITY
AND REDUCE
COSTS**



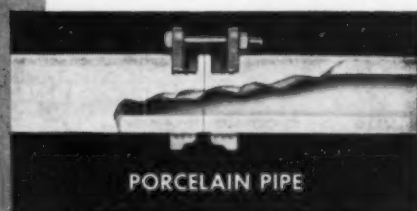
FLUSH VALVE

• Standard attachment to tank outlets. Poppet lines up with tank bottom, eliminating pocket at outlet.



SAFETY VALVE

• Pop-type valve. All-porcelain construction avoids contamination from contact of corrosive gases or liquids with metals or gaskets. Blow-off adjustable.



PORCELAIN PIPE

• If your processing system includes modern glass-lined, rubber-lined, lead-lined or tile processing tanks, you have installed this equipment because of the corrosive action of chemicals handled, or because of the need for purity. If you are experiencing trouble with valves or piping, or if there is unexplained trouble which might be attributable to valves, pipe or gaskets, you may need the special properties of Lapp Chemical Porcelain. This rugged, dense, non-porous body defies attack from any acid (except HF), is smooth, easily cleaned, and gives long, low-cost service. *Lapp Insulator Co., Inc., Chemical Porcelain Div., LeRoy, N.Y.*

• Strong uniform-section pipe, glazed inside and out. Precision grinding of pipe ends permits recommended use with thin hard gaskets, or where necessary, with no gaskets at all. Smooth, glazed surface, inside and out, permits easy cleaning, promotes purity.



Lapp

Chemical Porcelain

Ernie Pyle,

FAMED WAR CORRESPONDENT,

finds pure water vital to our fighting men



ERNIE PYLE, FAMED SCRIPPS-HOWARD WAR CORRESPONDENT

"... you could almost say an army marches on its water," wrote Ernie Pyle in a recent dispatch from the Mediterranean front. "When a water point is found, the engineers wheel in their portable purifying unit. This consists of a motorized pump, and sand filter, chlorinating machine and a collapsible 3,000-gallon canvas tank. The chlorine we inject comes in powder form in 1 gallon cans—we usually use 1 part of chlorine to a million parts of water. The engineers of the 45th Division brought with them enough chlorine to last 6 months. In addition to chlorine, alum and soda ash are injected into the water."



THAT "chlorine in powder form" which Ernie Pyle speaks of is, of course, high test calcium hypochlorite, and, as likely as not, it's Mathieson HTH. That soda ash, too, is probably fused soda ash in tablet form made by Mathieson especially for use by our armed forces overseas.

Not as spectacular but just as important a war job is being done on the production front by

other Mathieson Chemicals—caustic soda, soda ash, liquid chlorine, ammonia, sodium chlorite, sodium methyrate, magnesium metal, liquid and solid carbon dioxide. These products are vital raw materials in nearly every phase of American war production, including ships, planes, tanks, guns, gasoline, clothing, food, medical supplies and many other materials which will go to make up final victory for the United Nations.

Mathieson CHEMICALS



THE MATHIESON ALKALI WORKS (Inc.) 60 EAST 42nd STREET, NEW YORK, N. Y.

LIQUID CHLORINE... SODA ASH... CAUSTIC SODA... BICARBONATE OF SODA... BLEACHING POWDER... HTH PRODUCTS... AMMONIA, ANHYDROUS and AQUA... FUSED ALKALI PRODUCTS... SYNTHETIC SALT CAKE... DRY ICE... CARBONIC GAS... SODIUM CHLORITE PRODUCTS... SODIUM METHYLATE

THE BOOK OF EXPERIENCE



If the knowledge accumulated by Michigan Smelting in its 50 years of specialized experience were gathered together, it would form an authoritative and basic reference book covering this entire industry. Non-ferrous scrap metal refining has been our business for half a century. The sound technical knowledge and wide practical experience possessed by our executive staff is at your disposal. When you are in the market for non-ferrous alloys, consult us for your requirements, no matter how rigid, exacting or unusual.

NON-FERROUS SCRAP METAL REFINERS FOR 50 YEARS

MICHIGAN SMELTING and Refining

Division of

BOHN ALUMINUM & BRASS CORPORATION • Detroit, Michigan

General Offices: Lafayette Building



BUY
WAR
BONDS

It is practical experience that counts in applying Super Refractories

IN firing steatite—roasting corrosive ores—treating metal parts—reducing and refining non-ferrous metals, radically different conditions are encountered. Yet, in these diverse operations there is a common need—the need for super refractories such as produced by Carborundum. With the variable conditions existing in these as well as numerous other types of installations, no one grade or kind of super refractory is capable of meeting their individual requirements.

There are now more than sixty-five varieties of Carborundum Brand Super Refractories, each designed

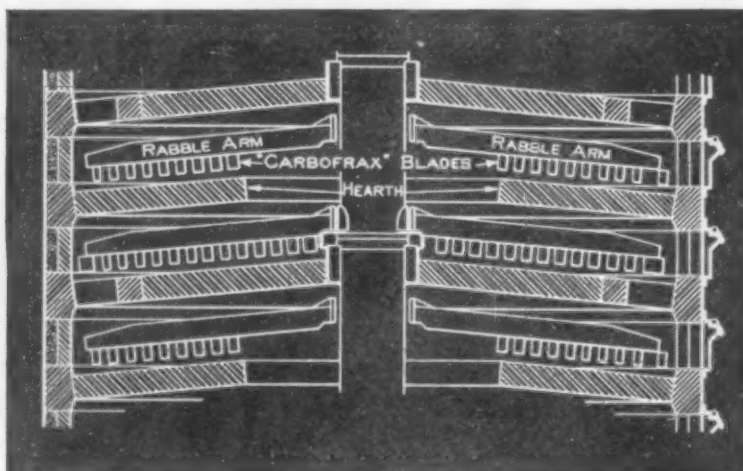
to withstand specific service needs. But of equal importance is the ability of our engineering staff to select the right super refractory for the purpose and apply it to a given installation.

Our comprehensive understanding of refractory problems—gained from years of practical and technical experience—has proved exceptionally valuable to war industry plants. It will be equally advantageous to operators of new and improved processes for the post war era.

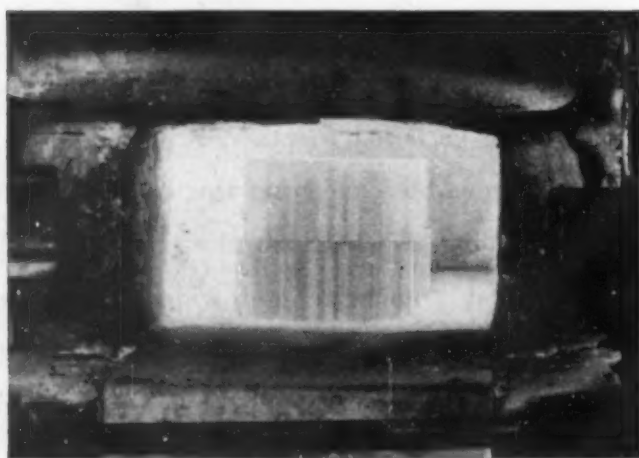
Let us consult with you on your refractory problems.



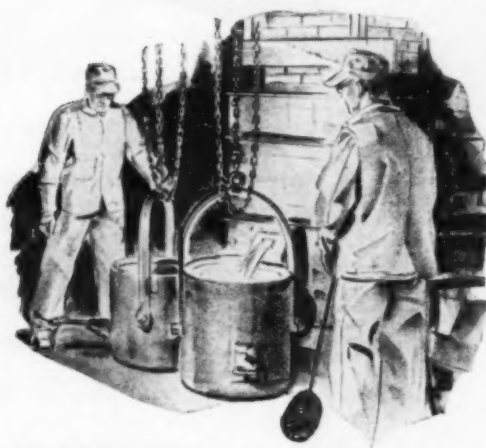
1 Firing Steatite



2 Roasting Corrosive Ores



3 Annealing



4 Reducing and Refining Non-ferrous Metals

Every hour this war is shortened will save \$12,000,000. The lives it will save are priceless. Let's get it over with—quickly!



Refractory Division, THE CARBORUNDUM COMPANY, Perth Amboy, N. J.

MANUFACTURERS OF GRINDING WHEELS, COATED ABRASIVES, SUPER REFRACTORIES, HEATING ELEMENTS

District Sales Branches: Chicago, Philadelphia, Detroit, Cleveland, Boston, Pittsburgh. Distributors: McConnell Sales and Engineering Corporation, Birmingham, Ala.; Christy Firebrick Company, St. Louis, Mo.; Harrison & Company, Salt Lake City, Utah; Pacific Abrasive Supply Company, Los Angeles, San Francisco, Calif.; Denver Fire Clay Company, El Paso, Texas; Smith-Sharp Company, Minneapolis, Minn.

(Carborundum, Carbofrax, Alfrax and Mullfrax are registered trade-marks of and indicate manufacture by The Carborundum Company)

"...for your fine record of performance..."



thank you.... **Uncle Sam!**

● We, the men and women of National Engineering Company, are proud to receive the Army-Navy award for achievement in the production of equipment for the manufacture of the sinews of war... yet, we are humble in the realization that our part is but a small one. We are humble in the knowledge that our contribution toward victory is modest compared to that of our sons, husbands and brothers on the fighting fronts around the globe... again, thank you, Uncle Sam, for this banner. It will serve as a constant challenge to do our part toward the achievement of greater war production. . . .



● Since Pearl Harbor, the men and women of National have produced more than 1000 Simpson intensive Mixers and have engineered more than 50 major sand systems in foundries throughout the nation, for the proper preparation of foundry sand to produce war castings. . . .

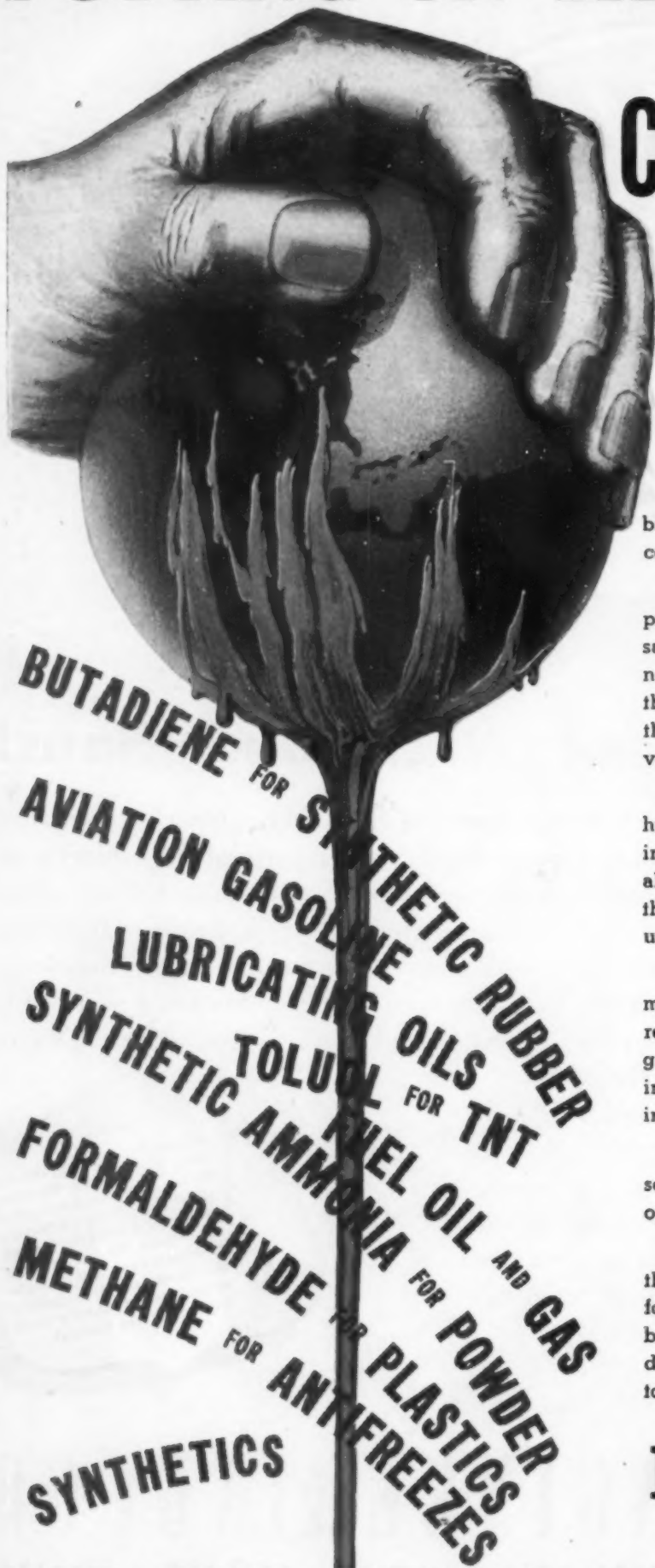
NATIONAL ENGINEERING CO.

MACHINERY HALL BUILDING • CHICAGO 6, ILLINOIS

Manufacturers and Selling Agents for Continental European Countries:—The George Fischer Steel & Iron Works, Schaffhausen, Switzerland. For the British Possessions, Excluding Canada and Australia—August's Limited, Halifax, England. For Canada—Dominion Engineering Co., Ltd., Montreal, Canada. For Australia and New Zealand—Gibson, Battle & Co., Pty., Ltd., Sydney, Australia

PUTTING ON THE PRESSURE

with COMPRESSORS



Enormous quantities of raw gases and oils are being squeezed from the bowels of the earth and converted into many of the most vital war materials.

If you are a petroleum or chemical engineer or production man, you know the story, but it is a satisfaction to the rest of us to know that you are not bleeding old Mother Earth to death . . . that there will be enough left for future generations, so that they, too, can share the comforts and conveniences made possible by petroleum products.

By repressuring, you are prolonging the life of hundreds of fields for years to come, by recycling in distillate fields, you are taking gases that have already yielded much gasoline and are returning them under high pressures to the sands for future use.

By constantly improving production and refining methods, you are making every well, every barrel of oil, and every cubic foot of gas yield a greater quantity of usable product. You are making them yield higher-quality products in ever-increasing variety.

The heart of each of these phases is the compressor . . . one of the machines that must be able to operate continuously 24 hours a day, day after day.

And the name *Ingersoll-Rand* on so many of these machines, as well as their records of performance, will undoubtedly be the signpost to buyers in post-war expansion of this essential industry. In the meantime our engineers will be glad to co-operate in helping to solve your problems.

Ingersoll-Rand

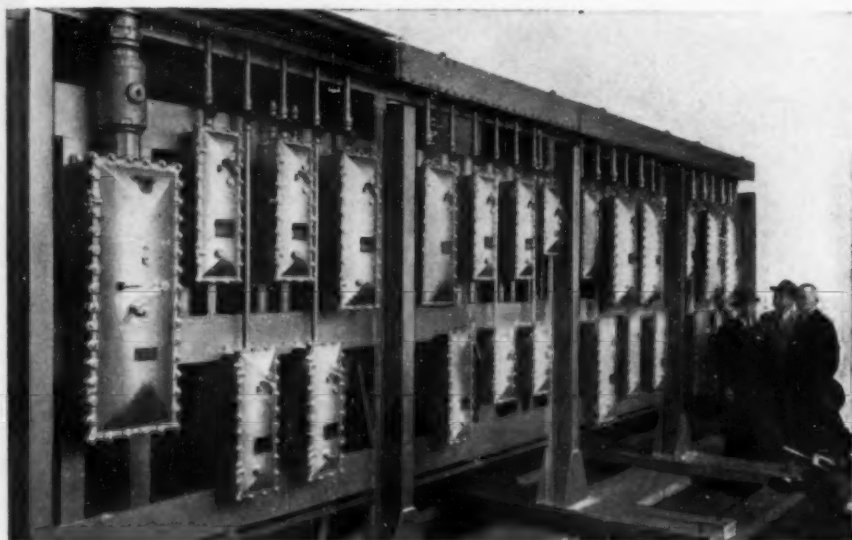
11 Broadway, New York, N. Y.

6-340

COMPRESSORS • TURBO BLOWERS • ROCK DRILLS • AIR TOOLS • OIL AND GAS ENGINES • CONDENSERS • CENTRIFUGAL PUMPS

Now

**You Can Order a Complete
Low-voltage Control System as
Easily as You Order Motor Starters**



An assembly of 25 explosion-proof combination starters being installed outdoors at an oil refinery. For motors from 3 hp to 100 hp, 440 volts. Note the explosion-proof bus trough and seal-off fittings

WHEN you get everything you need in a single purchase, you avoid the disadvantages of piecemeal buying and piecemeal installation.

These controls are factory-assembled in a group, then wired and shipped as one complete unit. You save valuable time in selection, ordering, and layout. You have only to place the unit and connect the incoming line and the outgoing motor leads.

These starters are made of cast, high-strength alloy, and have the strength to withstand internal explosions. The flanges, which are securely bolted on all sides, are ground to tolerances that will not permit the escape of hot gases.

These pre-assembled units save critical materials required for conduit, junction boxes, and special fittings on separately mounted devices. For complete details on the advantages and applications of group controls, get in touch with our local office. *General Electric Company, Schenectady, N. Y.*

Every week 192,000 G-E employees purchase more than a million dollars' worth of War Bonds

GENERAL  ELECTRIC

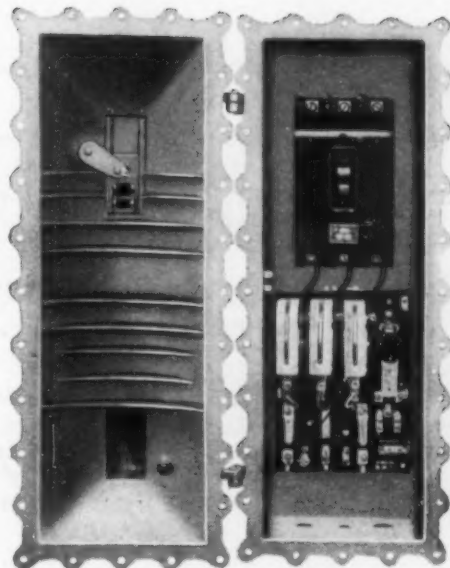
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**G-E Factory-assembled
Group Control**

Simplifies layout problems

Cuts installation time

Saves critical material

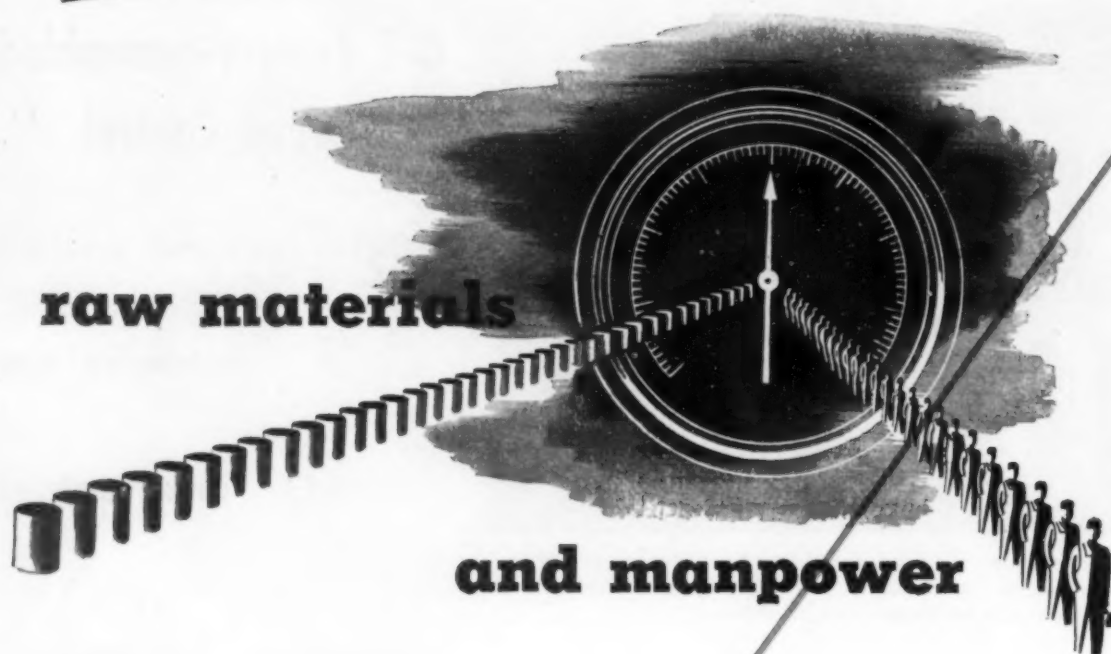


A G-E enclosed, combination magnetic switch (Size 2) and air circuit breaker, for hazardous gas locations, Class I, Group D



**MOTOR CONTROL
FOR
HAZARDOUS AREAS**

Take the pressure off



If your plant uses a Dowtherm System, you already know the facts of this report. Manufacturers tell us that by utilizing Dowtherm—the high temperature, low pressure, heat transfer medium—operating efficiency increases materially.

Here are the major points of interest to you:

- Through Dowtherm, high pressures can be avoided in the 400-700° F. range, effecting savings in structural materials.
- Dowtherm makes possible a clean, modern system—providing vastly improved working conditions

in many types of plants—saving precious man-hours.

- Dowtherm prevents severe, localized overheating—assures a uniformity of product and maximum use of raw materials.

These are a few of the many Dowtherm advantages. Based on actual service records, we can tell you that a Dowtherm installation will pay you well—now and in the future. If you are not already acquainted with this system, why not write to us for further information? Address Dowtherm Division.

THE DOW CHEMICAL COMPANY, MIDLAND, MICHIGAN

New York • Cleveland • Chicago • St. Louis • Houston • San Francisco • Los Angeles • Seattle



DOWTHERM

THE HIGH TEMPERATURE, LOW PRESSURE, HEAT TRANSFER MEDIUM



CHEMICALS INDISPENSABLE
TO INDUSTRY AND VICTORY



Accuracy that Counts on all Fronts

At first glance there would seem to be little relationship between an intricate, 10-foot long height finder and a microscope objective with lenses of less than one millimeter in radius. Yet both are the products of the same eyes, the same facilities, the same standards of accuracy, the same experience. Both are products of America's war effort. Both are products of Bausch & Lomb.

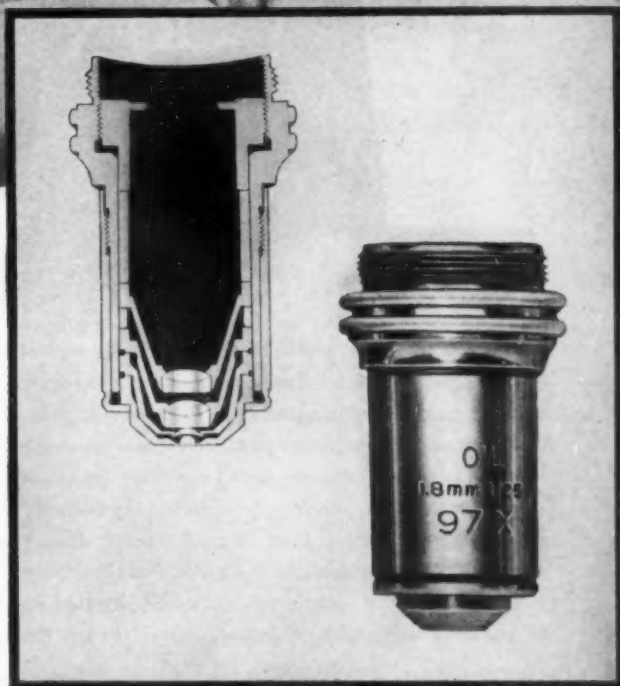
The lens computing and grinding skills that for years have produced the minute, exceedingly accurate lens components of the microscope objective are today also being employed in the production of height-finders and gunfire control instruments that are helping America's armed forces to win an earlier victory.

This quantity production of precision optical instruments, pioneered and mastered by Bausch & Lomb through years of peace, has become a highly valued asset to an America at war. Here again, because of its wartime accomplishments, Bausch & Lomb will be able to extend its optical services to wartime pursuits when Victory is won.

BAUSCH & LOMB

OPTICAL CO. • ROCHESTER, NEW YORK

ESTABLISHED 1853



Bausch & Lomb Oil Immersion Objective—97X-N.A. 1.25—1 1/4 x Actual Size.



*For Bausch & Lomb Instruments
essential to Victory—priorities
govern delivery schedules.*

AMERICAN SCIENTIFIC INSTITUTION PRODUCING OPTICAL GLASS AND INSTRUMENTS FOR MILITARY USE, EDUCATION, RESEARCH, INDUSTRY AND EYESIGHT CORRECTION



Bulletin 839

CONTENTS

Adaptor Connections	Lengths (Stock)
Bill of Materials	Maximum Unsupported
Bolting the Flanges	Span Length
Chemical Stability	Mounting—Valves,
Cleaning	Strainers, Meters, etc.
Cleanout Fittings	Ordering
Contraction	Part Names
Cost	Pressures
Drain Lines	Protection
Emergency Repairs	Sizes
Expansion	Spacers
Fittings	Spare Parts
Fittings, Special	Sterilizing
Flange Painting	Stocking Spares
Gasket Blowing	Supports
Gas Pressures	Temperatures
Hangers	Testing for Leaks
Installation	Thermal Shock
Leaks	Resistance
Lengths, Maximum and	Unpacking
Minimum	Vibration

HOW TO INSTALL PYREX PIPING

Industrial Division
CORNING GLASS WORKS, CORNING, N. Y.

A recent survey has disclosed the fact that many engineers have passed up the combined advantages of PYREX Glass Pipe lines because of difficulties which might be encountered in installation, when actually most of these difficulties are non-existent. Any competent plant maintenance man can install a PYREX Glass Pipe line as readily as he can install any other type of pipe line.

In order to further simplify the installation procedure, Corning has produced a new bulletin "How to Install PYREX Piping." In it you will find all of the answers to questions you may have on the subject. Note the table of contents.

After reading this bulletin you will readily see that installation problems are no reason for doing without these qualities of PYREX Piping:

- | | |
|-----------------------------------------------------------------------------|---------------------------------------------------------------------------------|
| 1—Resistance to all acids and alkalis in solution, except HF. | 4—A smooth hard surface which resists abrasion and is conducive to smooth flow. |
| 2—Resistance to thermal shock. | 5—Long life which reduces cost to a minimum. |
| 3—Visibility which reveals both the condition of the pipe and its contents. | Send for your copy of this bulletin now. Use the coupon. |

Corning Glass Works, *Industrial Division*, Dept. CM3, Corning, New York.

Gentlemen:

I would like glass piping information immediately on the subjects I have checked below. I understand there is no obligation.

- | | |
|-----------------------------------------------------------|-----------------------------------|
| <input type="checkbox"/> Installation Manual | <input type="checkbox"/> Valves |
| <input type="checkbox"/> PYREX Piping and Heat Exchangers | <input type="checkbox"/> Adaptors |

Name.....
Firm.....
Street.....
City and State.....

"PYREX" is a registered trade-mark and indicates manufacture by Corning Glass Works, Corning, N. Y.

CORNING
Glass Works
Corning, New York

Pyrex Industrial Glass

Questions we are often asked

ABOUT GLASS-LINED STEEL

No. 3—Can Heavy Duty, Acid-Resistant Heat Exchangers Be Built of Pfaudler Glass-Lined Steel?



"Because continuous ceramic research is the cornerstone of the Pfaudler development program, we are today doing many things once thought impossible. At the same time we are paving the way toward making today's impossibilities realities tomorrow."

Dr. O. J. Chormann, Vice-President in Charge of Research of The Pfaudler Co.

Because of the pressures and acids involved, glass-lined heat exchangers have been developed for the polymerization of concentrated sulphuric acid, low-boiling hydrocarbons, and tertiary butyl alcohol in the

manufacture of butadiene. These heat exchangers replace lead bonded to steel. This eliminates the need for constant maintenance during operation. The resistance of glass is unaffected by agitation and aeration.

The "K" factor (thermal conductivity only) for glass-lined steel is estimated at 90. It is based on the transfer of 90 BTU's per hour per square foot per degree Fahrenheit temperature difference per inch of steel with glass covering. This is figured on the basis of 1", even though normal thickness of materials employed in manufacturing commercial glass-lined equipment is usually less than 1 inch.



"K" Series glass-lined steel high pressure reactor with impeller agitator and adjustable baffle increases range of process which can be handled effectively.

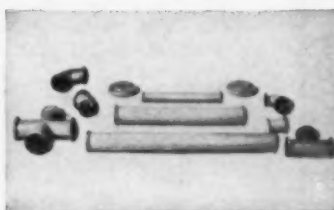


This value of 90 for "K" in a temperature range of 32 to 212°F. compares with 105 for Types 304, 316, and 321 stainless steel; and with a value of 180 for Monel; 230 for Lead, 420 for Nickel; 2680 for Copper.

While the figure given for the thermal conductivity of glass-lined steel is relatively low . . . it is significant that certain advances which we have made in our designs of agitators and baffles have enabled us to step up considerably our overall coefficients of heat transfer. In other words, the value of "U," or the value of the overall coefficient, has tended to approach the same value as "K."

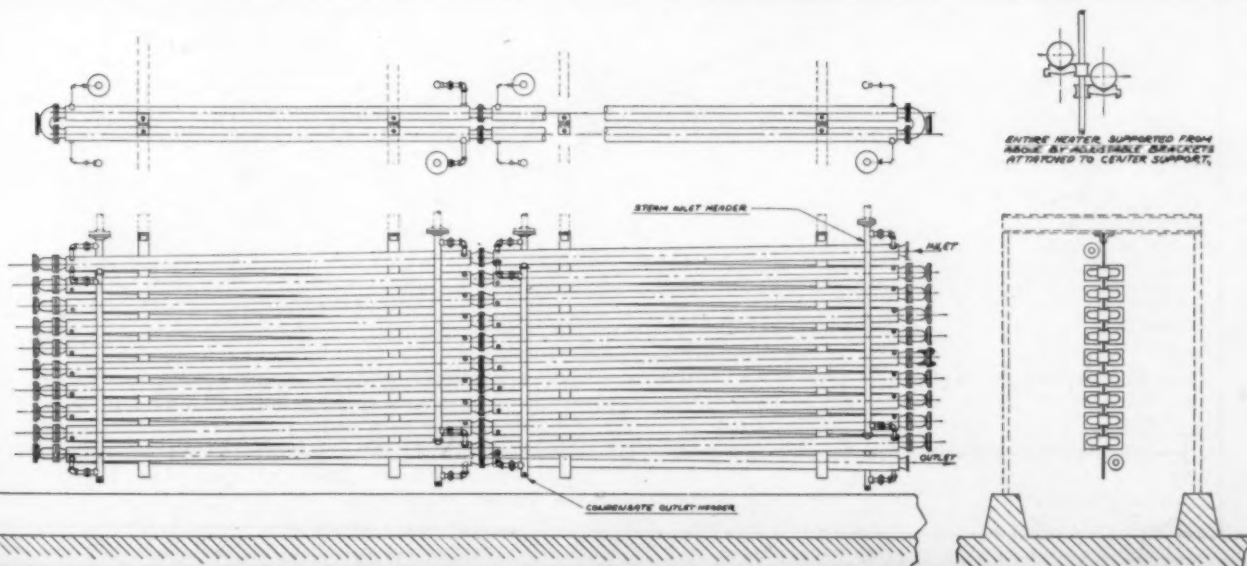
In giving you a value of 90 for "K," we are really quite conservative, and higher values have been measured. However, the thickness of glass applied to a given thickness of metal is a variable which has led us to adopt the above-indicated value of 90.

In calculations using the overall coefficient for heating and cooling, values of 60 to 80 may be satisfactorily used for heating, depending upon the viscosity of the product and conditions of heating; and values of 40 to 50 for cooling, again depending upon the nature of the product and the cooling conditions. How may we assist you with your heat transfer problem? THE PFAUDLER CO., Rochester 4, N. Y.



Glass-lined pipe, fittings and valves extend the protection only glass can give to all phases of production. Sizes range up from 1 1/4" minimum diameter.

BELOW: Pfaudler heat exchanger built of glass-lined jacketed pipe, with sections 10 feet in length. These sections are bolted together in combination with U-Bends which are gasketed with lead shrouded asbestos. Pressure conditions are high, duty difficult.



THE PFAUDLER COMPANY, ROCHESTER 4, NEW YORK

TWO NOMOGRAPHS FOR LOW AND HIGH WET BULB RANGE SOLVE PSYCHROMETRIC PROBLEMS

E. BERL and G. A. STERBUTZEL

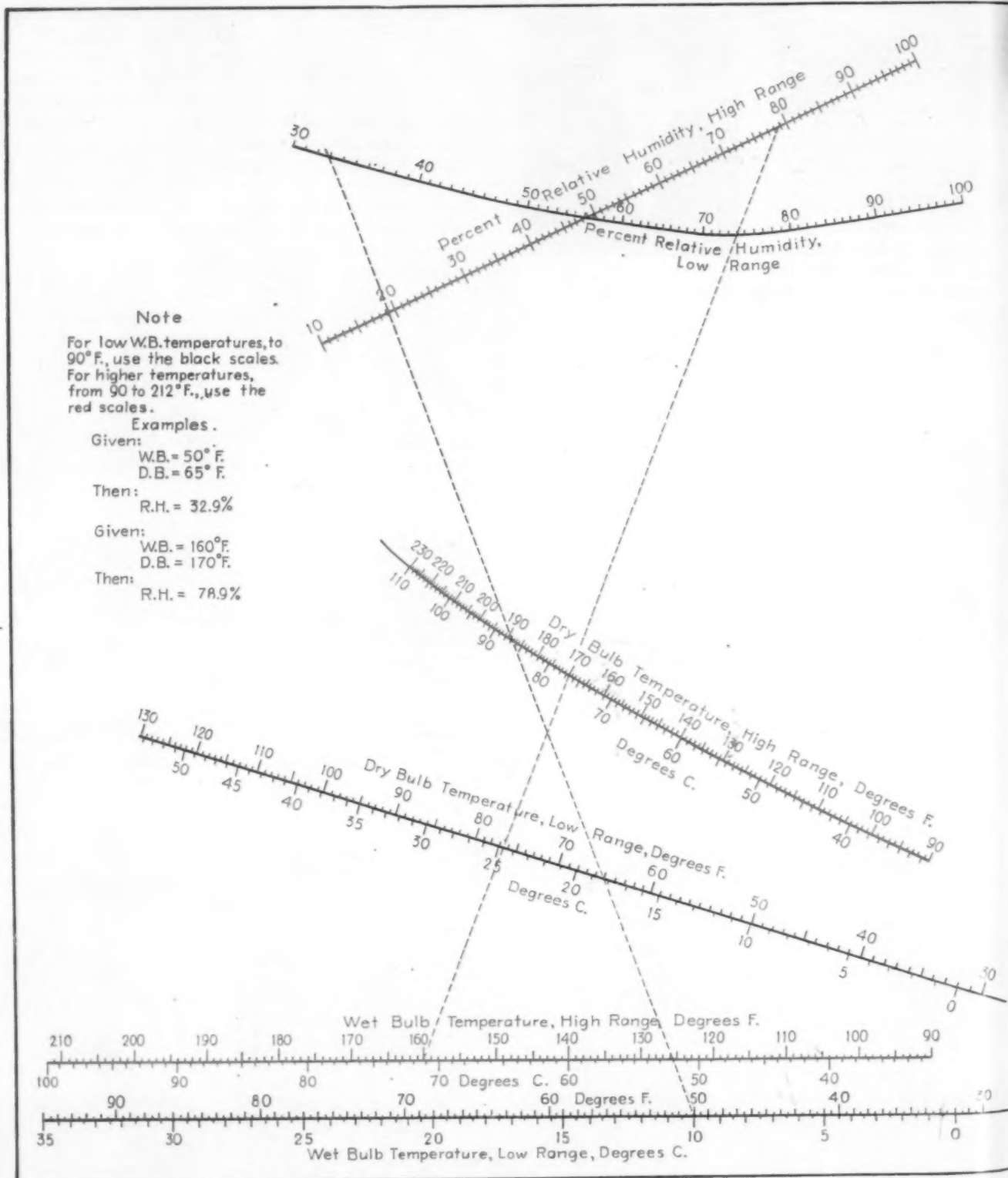
Carnegie Institute of Technology, Pittsburgh, Pa.

NOMOGRAPHIC solution of many types of engineering problems is considerably more convenient than the use of

This work was made possible by a grant to Carnegie Institute of Technology from the Buhl Foundation, for which the authors express their appreciation.

tables or calculations, in addition to being easier on the eyes for repetitive use. An important additional advantage is the fact that errors are much less likely to be made when some form of graphical computation means is used. The two charts presented here have re-

cently been prepared to permit making psychrometric calculations with a maximum of accuracy. It was not found possible to secure the desired accuracy when a single chart was used to cover the entire range of wet bulb temperature. The chart with black scales therefore covers the range of wet bulb temperatures to 90 deg. F., while the red chart serves for wet bulb temperatures from 90 to 212 deg. F. As indicated by the examples shown in dashed lines, one line only is needed for each calculation while computation is completely avoided





FLUOSULFONIC ACID

A NEW CHEMICAL TOOL!

Potential Industrial Applications:

Aromatic Sulfonyl Fluorides • Sulfuryl Fluoride
Alkyl Fluosulfonates • Boron Trifluoride
Acyl Fluorides • Sulfamido Acids • Preparation
of Aryl Fluosulfonates • Other Alkyl reactions

Physical Characteristics:

Mobile, nearly colorless liquid.
Boils without decomposition at 330° F. (165.5° C.)
Freezes at -125° F. (-87.3° C.)
Specific gravity: 1.74 at 60° F. (15.6° C.)
Vapor pressure: 3mm Hg at 80° F. (26.7° C.)
Most salts soluble in water.

General Chemical Fluosulfonic Acid may open up a new avenue of approach to many of your research problems. For further information address your request to the Technical Service Office nearest you.

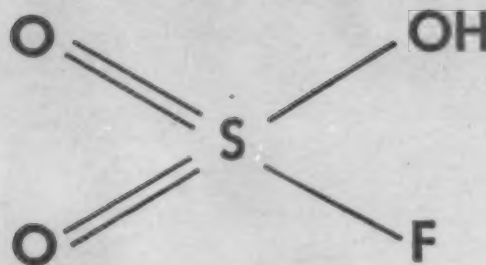


FIRST IN FLUORIDES

GENERAL CHEMICAL COMPANY

40 RECTOR STREET, NEW YORK 6, N. Y.

Technical Service Offices: Atlanta • Baltimore • Boston • Bridgeport (Conn.)
Buffalo • Charlotte (N. C.) • Chicago • Cleveland • Denver • Detroit
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Philadelphia • Pittsburgh • Providence (R. I.) • St. Louis • Utica (N. Y.)
Pacific Coast Technical Service Offices: San Francisco • Los Angeles
Pacific Northwest Technical Service Offices: Wenatchee and Yakima (Wash.)
In Canada: The Nichols Chemical Co., Ltd. • Montreal • Toronto • Vancouver

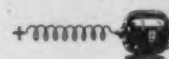


Some Future Uses of HSO₃F

Alkylating agent in manufacture of high octane fuel for the post-war "plane-mobile."



Reagent in production of synthetic polymers with dielectric properties.



Superior high pressure lubricants.



Other possible uses: In the manufacture of dye intermediates, insecticides, cutting oils, etc.

GENERAL CHEMICAL FLUORINE COMPOUNDS

Fluorides

Acid Hydrofluoric, Anhydrous
Acid Hydrofluoric, Aqueous
Aluminum Fluoride, Anhydrous
Aluminum Fluoride, Crystal
Ammonium Bifluoride
Ammonium Fluoride
Barium Fluoride
Boron Trifluoride
Chromium Fluoride
Copper Ammonium Fluoride
Cupric Fluoride
Ferrous Fluoride
Fluoride Fluxes
Lead Fluoride
Lithium Fluoride
Magnesium Fluoride
Nickel Fluoride
Polyacid Fluorides
(e.g. KF · x HF)
Potassium Fluoride, Anhydrous
Potassium Fluoride, Crystal

Sodium Bifluoride
Sodium Fluoride
Strontium Fluoride

Fluoborates

Acid Fluoboric
Ammonium Fluoborate
Cadmium Fluoborate
Chromium Fluoborate
Ferrous Fluoborate
Indium Fluoborate
Lead Fluoborate
Nickel Fluoborate
Potassium Fluoborate
Silver Fluoborate
Sodium Fluoborate
Stannous Fluoborate
Zinc Fluoborate

Fluosulfonates

Acid Fluosulfonic



Are you enjoying the advantages of

VARIABLE SPEED

On many applications, variable speed operation offers tremendous advantages. The Master Speedranger provides this infinitely variable speed in a compact all metal unit of proven reliability.

SIMPLE COMPACT DESIGN Only with an all-metal drive is it possible to secure the compactness, simplicity, flexibility and economy that are so advantageous on modern production machines and processes.

ALL-METAL The all-metal construction insures long life and the greatest possible freedom from interruptions to service. The design is extremely simple, consisting of a metal ring which operates at a variable position on the two driving and two driven cones. The position of the ring on the cones determines the speed of the output shaft.

PROVEN RELIABILITY Millions of hours of service in the field and exhaustive tests in the laboratory have proven conclusively the complete reliability of this device.

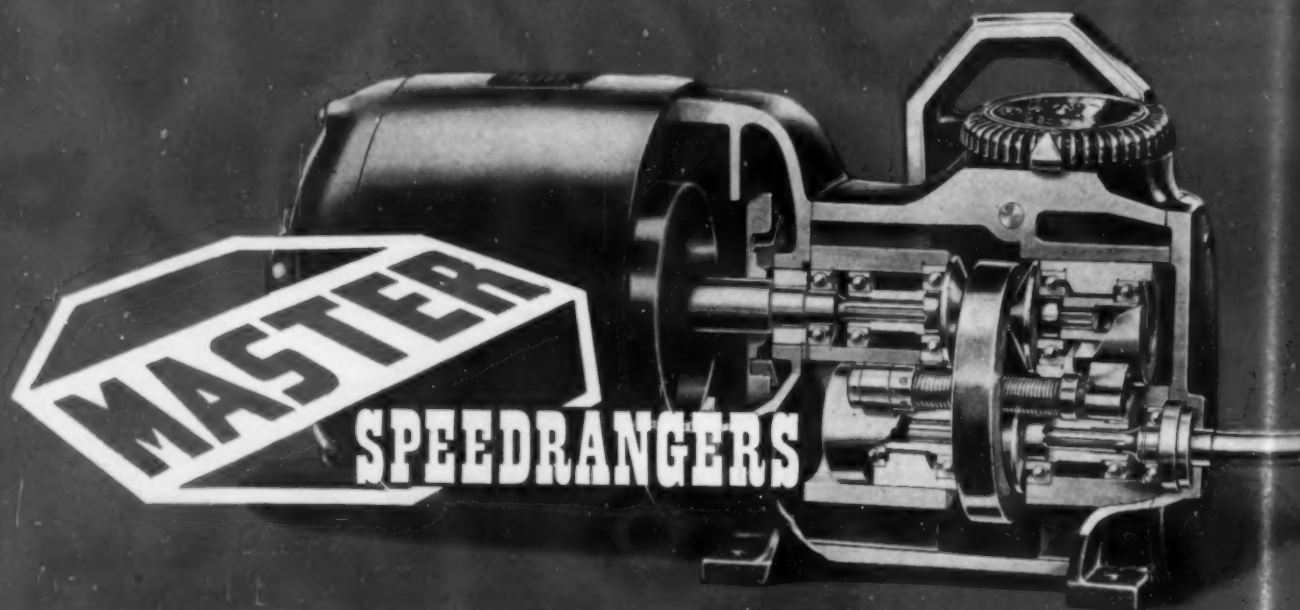
EXTREME FLEXIBILITY Speedrangers can be supplied for single phase, polyphase, or direct current operation. They can be furnished also with integrally built gear reduction units and electric brakes . . . in enclosed, splash proof, fan cooled or explosion proof construction and for a wide variety of mounting arrangements. No other variable speed unit on the market today can give you such flexibility and compactness.

UNDIVIDED RESPONSIBILITY The complete Speedranger is designed and built in one plant by one manufacturer as an integral, compact power unit.

HORSEPOWER Now available in sizes up to and including 3 horsepower.

SPEED RANGES Up to 9 to 1 are available. (up to 15 to 1 in some sizes).

THE MASTER ELECTRIC COMPANY • DAYTON 1, OHIO



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New York
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Plants

CHEM

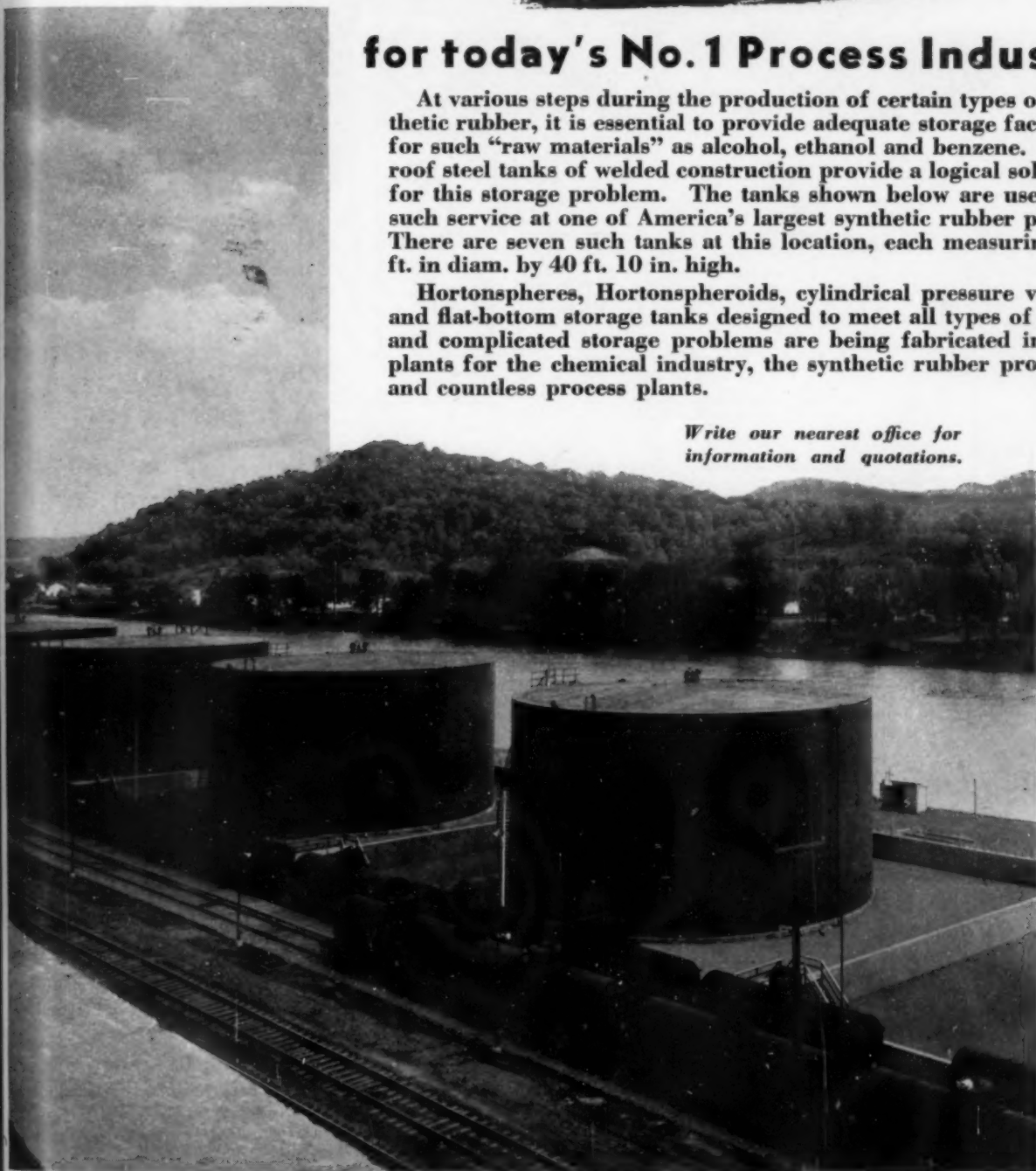
Storage Tanks

for today's No. 1 Process Industry

At various steps during the production of certain types of synthetic rubber, it is essential to provide adequate storage facilities for such "raw materials" as alcohol, ethanol and benzene. Cone roof steel tanks of welded construction provide a logical solution for this storage problem. The tanks shown below are used for such service at one of America's largest synthetic rubber plants. There are seven such tanks at this location, each measuring 78 ft. in diam. by 40 ft. 10 in. high.

Hortonspheres, Hortonspheroids, cylindrical pressure vessels and flat-bottom storage tanks designed to meet all types of plain and complicated storage problems are being fabricated in our plants for the chemical industry, the synthetic rubber program and countless process plants.

Write our nearest office for information and quotations.



... Awarded
to our shipyard
at Seneca, Ill., and
our drydock yards at
Eureka, Calif. and New-
burgh, N. Y.

CHICAGO BRIDGE & IRON COMPANY

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New York 6.....3318-165 Broadway Bldg.
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Cleveland 15.....2220 Guildhall Bldg.

Birmingham 1.....1510 North Fiftieth St.
Washington 5.....330 Bowen Bldg.

Houston 1.....5603 Clinton Drive
Tulsa 3.....1623 Hunt Bldg.
GreenvilleYork Street
San Francisco 5.....1022 Rialto Bldg.

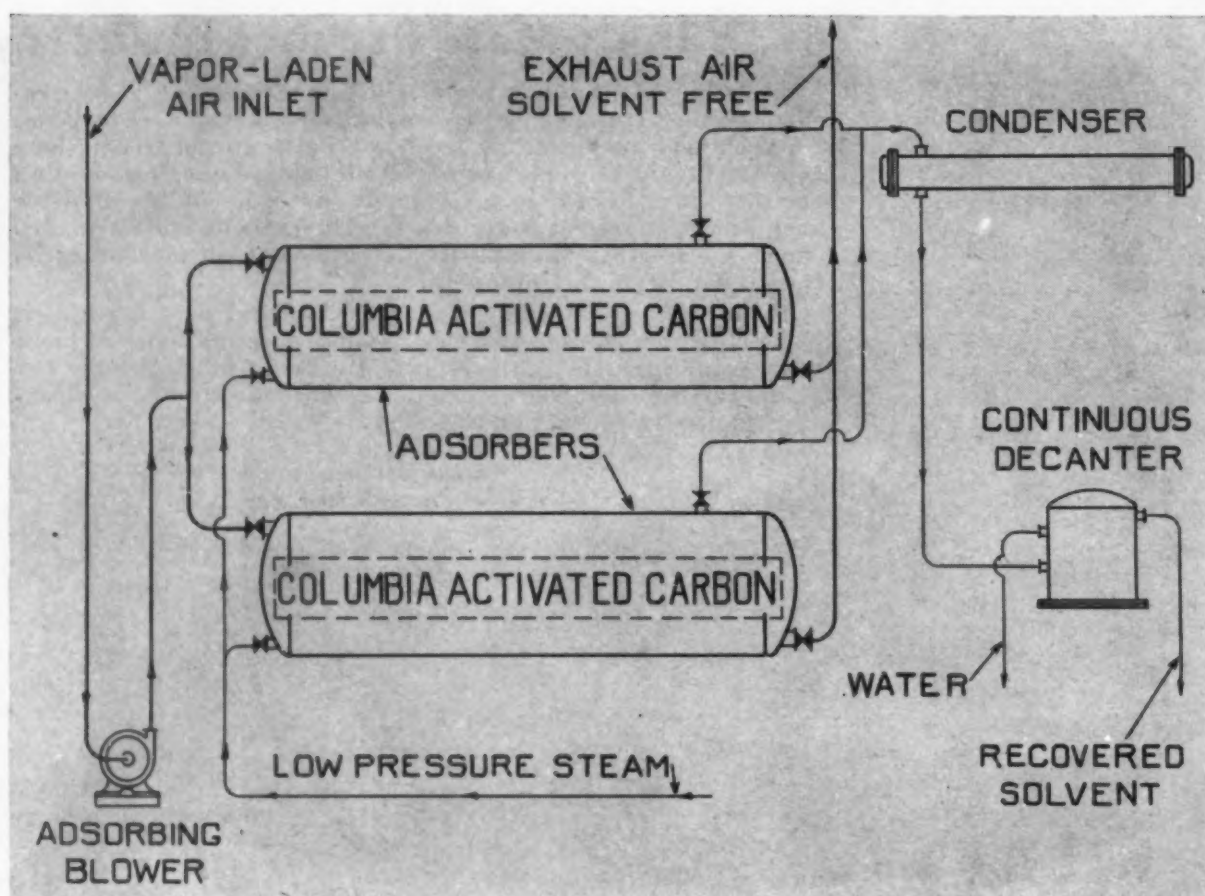
Plants in BIRMINGHAM, CHICAGO and GREENVILLE, Pa.



In Canada: HORTON STEEL WORKS, LIMITED, FORT ERIE, ONT.

How Solvent Vapors Are Recovered From Air

With COLUMBIA Activated Carbon



SOLVENT recovery plants using COLUMBIA Activated Carbon are being used in many types of manufacturing operations where solvents are vaporized. All kinds of organic solvents—alcohols, chlorinated compounds, esters, ethers, hydrocarbons, ketones, and carbon bisulfide—can be recovered with high-operating efficiency and low recovery cost. Many of the large plants are automatically operated.

Here is how one simple type of solvent-recovery system works:

The vapor-laden air is drawn into the collecting plant by the blower, and is passed through the bed of activated carbon. The activated carbon adsorbs the solvent vapor, and the solvent-free air is discharged to the atmosphere.

When the activated carbon has adsorbed the desired amounts of solvent . . . in ordinary operations this takes about 30 minutes to one hour . . . the air stream is switched to another adsorber.

"Columbia" is a trade-mark of Carbide and Carbon Chemicals Corporation

The adsorbed solvent is driven out of the carbon bed with low-pressure steam and the steam-solvent vapor mixture is condensed.

If the solvent is not soluble in water, it is separated by an automatic decanter. When the solvent is water-soluble, it is separated by distillation.

We design and supply complete solvent recovery plants to meet individual manufacturing problems. Write for our booklet, "Solvent Recovery by the COLUMBIA Activated Carbon System."

For information concerning the uses of COLUMBIA Activated Carbon, address:

CARBIDE AND CARBON CHEMICALS CORPORATION

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30 East 42nd Street  New York, N. Y.
PRODUCERS OF SYNTHETIC ORGANIC CHEMICALS

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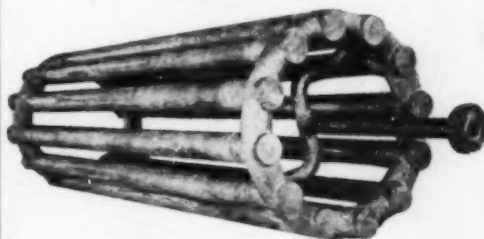
DURALOY



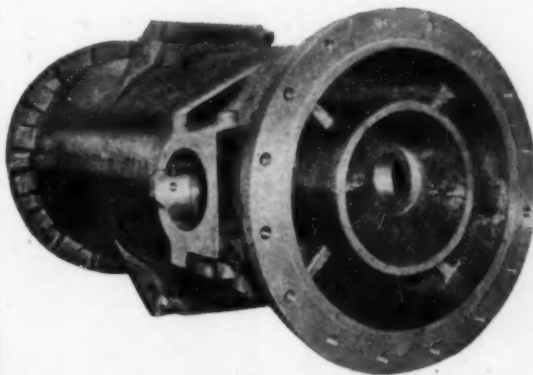
Rollers—2 lbs. each
Roller rail—25 lbs.



Elevator bucket—600 lbs.



Reaction chamber—2200 lbs.



Roasting furnace shaft—4 tons

DURALOY Castings are sound high alloy castings . . . the chrome-iron or chrome-nickel castings . . . produced by metallurgists and foundrymen who have specialized in this field since 1922. Duraloy Castings cover a great variety such as pump parts, rabble arms, pipe and fittings, links, tube supports, furnace parts and many others, in weights ranging from a pound or so to four tons . . . castings that give a quality service under severe high temperatures and biting corrosive conditions.

Duraloy rough or finished castings are produced in a modern and complete foundry equipped with several electric furnaces, sand-testing facilities, annealing furnace and machine shop.

Let us help you decide upon the proper analyses for your temperature, corrosion or abrasion problem. Then let us produce the castings.

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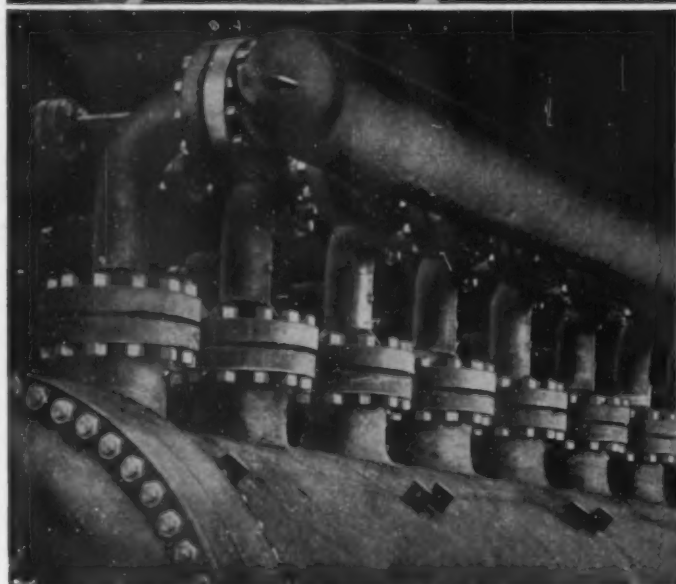
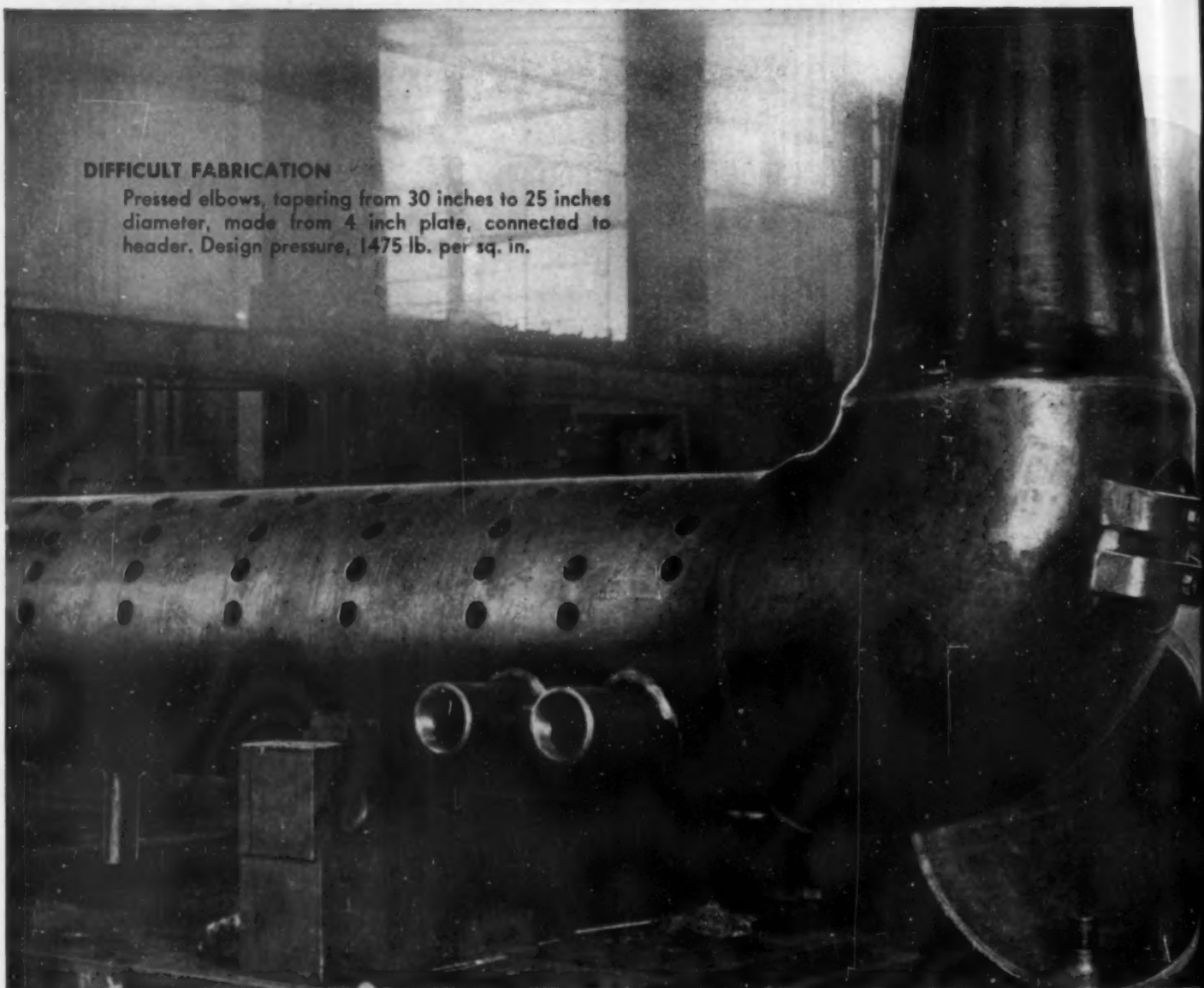
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101

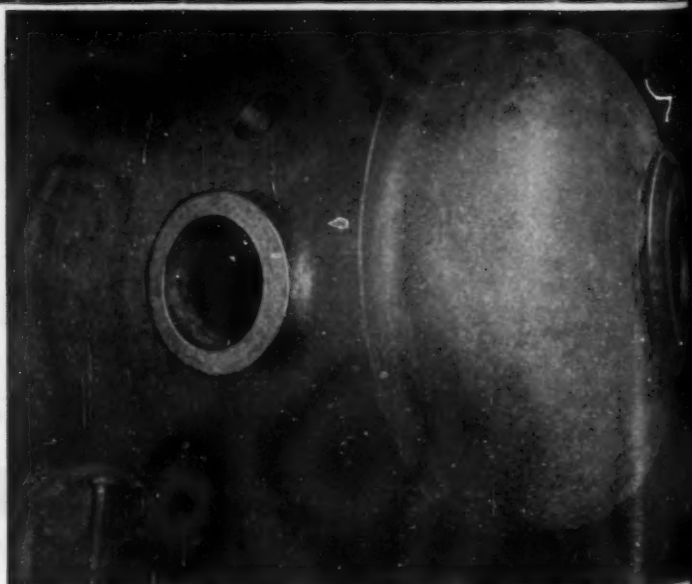
DIFFICULT FABRICATION

Pressed elbows, tapering from 30 inches to 25 inches diameter, made from 4 inch plate, connected to header. Design pressure, 1475 lb. per sq. in.



VESSELS FOR HIGH TEMPERATURE SERVICE

Vessel shown is built of Croloy 2 plate, with streamlined openings — for service at 100 lb. per sq. in. and 1050 F.



VESSELS FOR HIGH PRESSURE SERVICE

Showing pushout connection welded in 66 inch diameter shell. Design working pressure, 1475 lb. per sq. in. Pushout made of 6 1/4 inch plate.

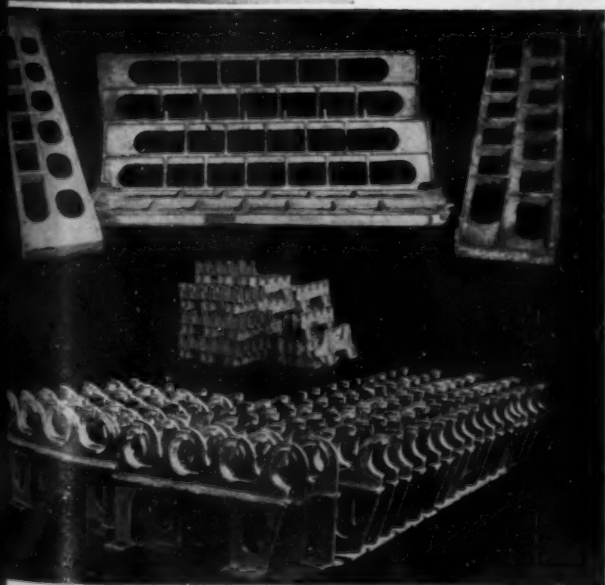
B&W process equipment solves problems of temperature and pressure

B&W designing skill and manufacturing experience are developing new and practical solutions for problems encountered in installations of vessels, drums, castings, forgings and tubular products where high temperatures or high pressures must be withstood. Production of such equipment represents a major activity at B&W, where an outline of your problem will be welcomed.

5-35-T

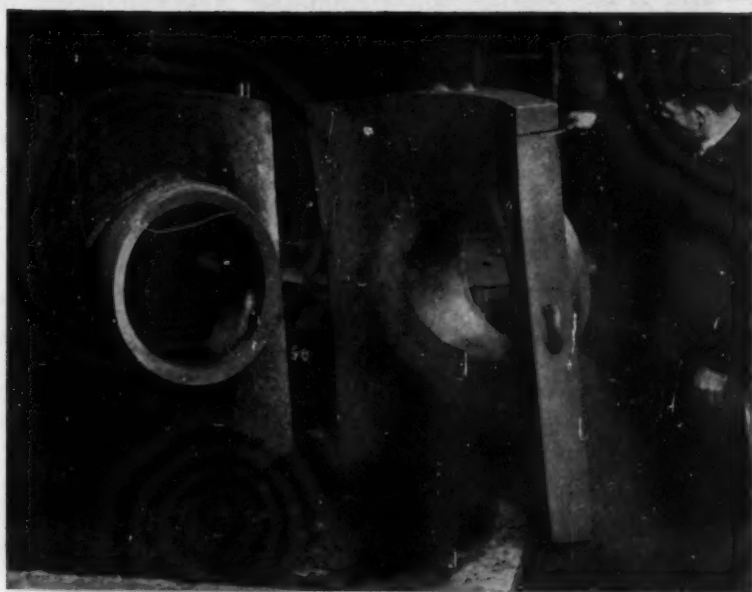
BABCOCK & WILCOX
VESSELS. DRUMS. CASTINGS. FORGINGS
FOR HIGH-TEMPERATURE, FOR HIGH-PRESSURE SERVICE.

THE BABCOCK & WILCOX CO., 85 LIBERTY ST., NEW YORK, N. Y.



B&W ALLOY TUBE SUPPORTS

More than two million pounds of B&W Alloy Tube Support Castings have been supplied for service temperatures as high as 2000 F., where high creep strength is required. Not a service failure has been reported.



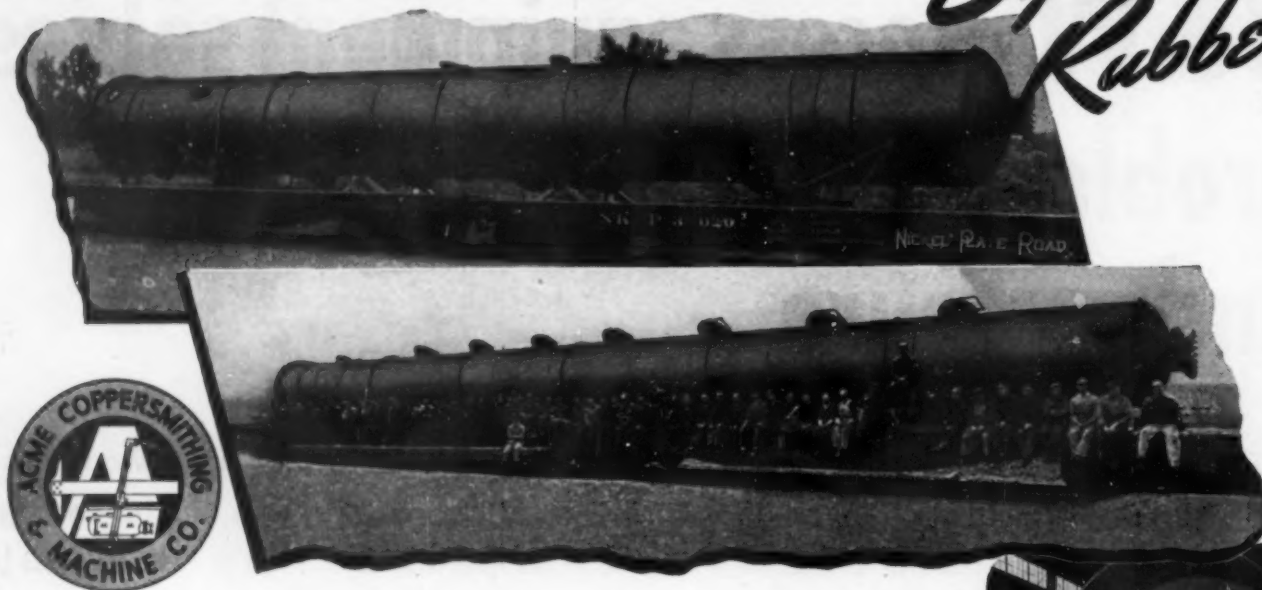
B&W STREAMLINED OPENINGS

All reinforcing is forged and drawn from parent metal. Concentration of stresses is avoided.

diam-
per

RING

MEETING THE CHALLENGE OF *Synthetic Rubber!*



When American Industry first rose to accept the Synthetic Rubber challenge, it became Acme's privilege to assist in the development of special process equipment, vitally needed for this program.

The distilling columns pictured above were fabricated by Acme in perfect harmony with the well-engineered plans of the designers. These units illustrate another instance in which correct function of the equipment was insured by intelligent and scientific planning and by the careful work of skilled craftsmen.

From engineering department and drafting room to the most modern tools of production, Acme is preeminently equipped to help in the solution of any complex process problem. Acme engineers, drawing from a vast reservoir of technical experience in diverse fields, have proven time and again their ability to cope with new problems.

To Acme, Synthetic Rubber was another challenge, successfully accepted.



ACME

Processing Equipment

ACME COPPERSMITHING & MACHINE COMPANY, ORELAND, PA.

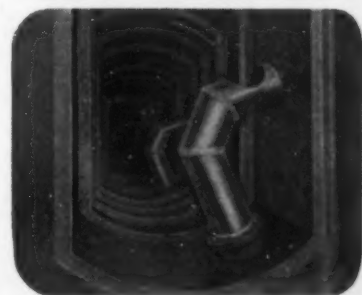
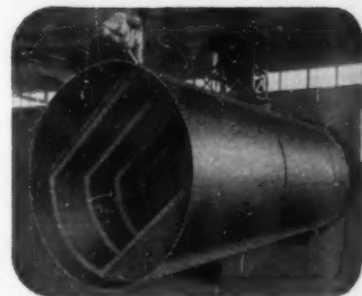
FIRST ILLUSTRATION

8'-0" in diameter and 73'-9" long, this column was fabricated by Acme for use in the Synthetic Rubber Program. Of all-steel welded construction, it was fabricated in full compliance with the A.S.M.E. Code.

SECOND ILLUSTRATION

This steel column, 6'-0" in diameter and 97'-0" long was fabricated in accordance with the A.S.M.E. Code for Unfired Pressure Vessels. Careful planning and precise fabrication insured perfect functioning.

★
The smaller illustrations depict the above vessels during stages of fabrication.



Heat Transier • Evaporation • Drying • Distillation • Absorption • Extraction • Crystallization



ERECTION *know-how*

an important Armstrong *EXTRA*

TWO THINGS make for lasting efficiency on any low-temperature insulation job . . . the efficiency of the insulating material itself, and the skill with which that material is erected. You get both when you specify "insulation by Armstrong."

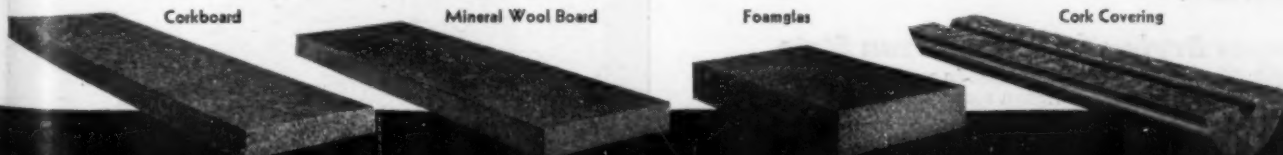
At "Insulation Headquarters" you have a complete range of efficient materials to choose from—Armstrong's Corkboard and Cork Covering, Foamglas, and Mineral Wool Board. Thus you can be sure that Armstrong's engineers will specify the material best suited to your needs. Their recommendations will be sound because they have a background of over 40 years' experience in low-temperature insulation work.

The all-important extra you get is the complete follow-through that Armstrong provides *after* you've chosen a material. This is possible first,

because Armstrong has offices and distributors spotted in strategic locations all over the country, and second, because all of these offices maintain complete crews of skilled mechanics who are specialists in erecting low-temperature insulation.

These experts have the know-how needed to meet any unusual problem of construction encountered on the job. When they erect insulation you can be *sure* the job is right—sure that it will deliver efficient, lasting service.

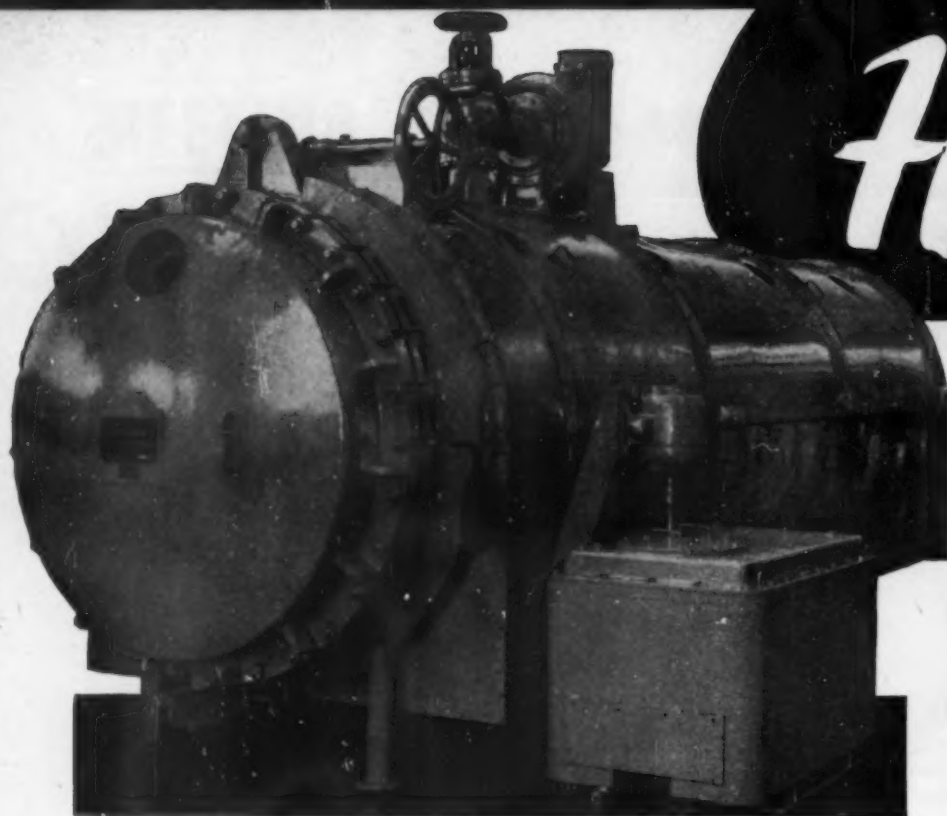
Remember this plus value the next time you consider insulation and bring your problems to "Insulation Headquarters." But don't wait until then to get the facts about Armstrong's Insulation. Write today! Armstrong Cork Company, Building Materials Division, 3312 Concord Street, Lancaster, Pennsylvania.



ARMSTRONG CORK COMPANY

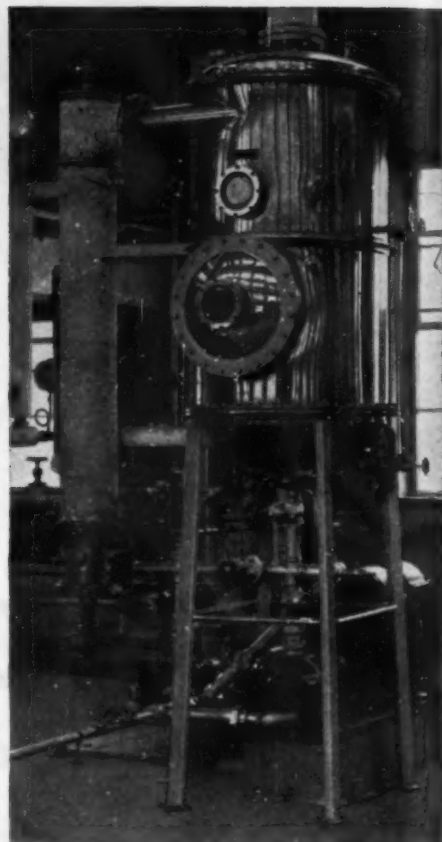
Insulation  *Headquarters*

Higher



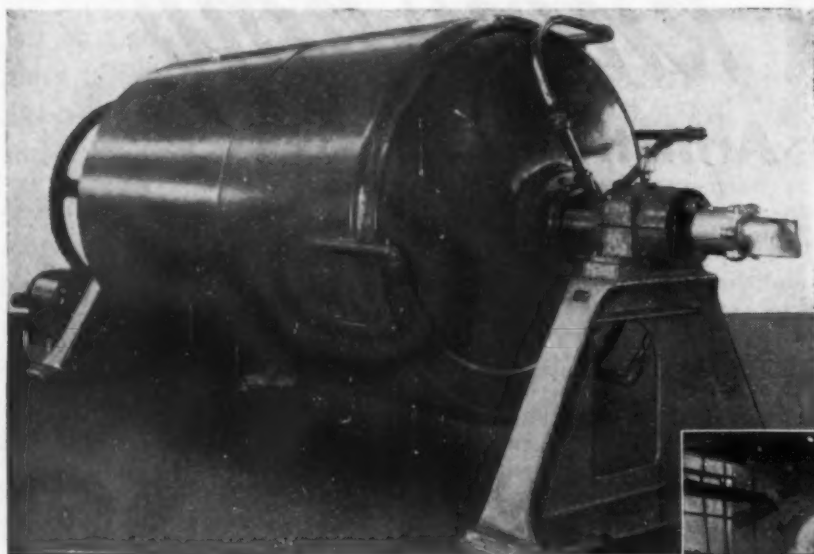
Vacuum Drying and Impregnating

Stokes Vacuum Impregnators are used for drying and impregnating power cable, radio coils, and condensers, armature and transformer coils, rope, lumber, and wood products, paper, fibre, felt, and other materials. Higher vacuum broadens their application.



Vacuum Distillation

Special Vacuum Still used as pilot plant for production of fruit juice concentrate. Higher vacuum, with lower operating temperature, assures flavor retention — removes danger of oxidation — preserves the original product characteristics.

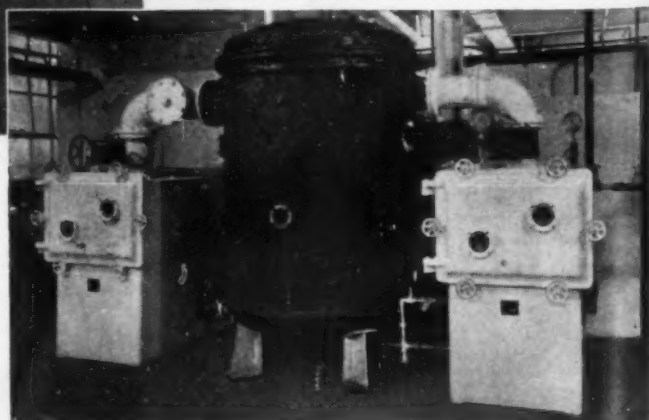


Low Temperature Vacuum Drying

Rotary Vacuum Dryer. Higher vacuum with corresponding, lower temperatures, makes it possible to manufacture products heretofore impractical in the chemical, metallurgical and food fields.

Vacuum Drying from the Frozen State

At right: The Stokes pilot plant used in research on food and biological drying from the frozen state under vacuum in the low micron range by the Lyophile-Cryochem sublimation processes. Apparatus of this type is in use throughout the world for such services as the desiccation of Blood Plasma, Penicillin and other labile biologicals. Stokes assisted in the pioneering of this new method.



F.J. Stokes

Vacuum . . .

A New Tool..Making Possible New Processes and Profits

- Desiccation of Blood Plasma, Penicillin, Serums
- Plating of Metals, Lenses, etc., by Molecular Bombardment
- Sublimation and Distillation of Pure Metals
- Drying of Heat-Sensitive Chemicals and Metal Powders
- Distillation of Essential Oils, Organic Chemicals, Food Concentrates
- Production of Magnesium by Ferro-Silicon or Carbo-Thermo Process

These are but a few of many problems which are being solved, through higher vacuum and Stokes-engineered Equipment.

We have pioneered in the field of higher vacuum . . . for years have developed equipment, pumps, gauges and other auxiliaries, supplied completely engineered vacuum processing systems, making it easy and economically practical to obtain and utilize higher vacuum . . . to use lower temperatures in processing heat-sensitive materials, speed up processes, prevent oxidation, reduce operating costs by utilizing exhaust steam or other less expensive heat, minimize fire and explosion hazards, make it easier to control obnoxious fumes . . . and today, to open up entirely new fields of manufacture for tomorrow's products.

If you couldn't attend the Exposition of Chemical Industries, you will want to know about the new Stokes Microvac Pump which is the heart of higher vacuum processing—a feature of the show.

Also the latest designs of high vacuum equipment for the processes listed above and other services in the rapidly expanding application of high vacuum practice in the biological, chemical, metallurgical, food and electrical industries.

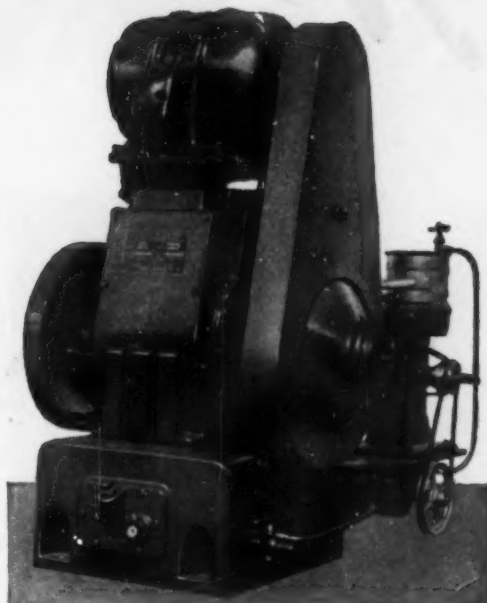
Besides the field of Higher Vacuum, Stokes have also pioneered in Completely Automatic Plastics Molding and in Powder Metallurgy. You will also want to hear about the latest Stokes developments in these fields—about the Completely Automatic "Press of the Future," one of several interesting and novel Stokes developments for post-war plastics production—about the new, high-capacity Powder Metallurgy Press which automatically controls uniform density of compressed parts.

We will be glad to send you further information on these developments, described in our current issue of Process News. Ask for your copy.

F. J. STOKES MACHINE COMPANY

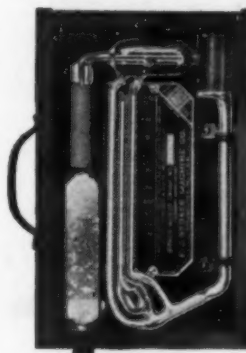
5920 Tabor Road Olney P. O. Philadelphia 20, Pa.

Representatives in New York, Chicago, Cincinnati, St. Louis, Cleveland, Detroit
Pacific Coast Representative: L. H. Butcher Company, Inc.



New Stokes Microvac Pump for Vacuum in the Low Micron Range

An entirely new oil-sealed Rotary Pump—the product of many years of high vacuum research and experience. Greater volumetric efficiency. Higher vacuum—in many cases these Pumps are operating in a narrow range of less than 10 microns. Smaller, more compact design for the same capacities. Rugged construction. New improved built-in motor-driven continuous oil clarifier. Many other features.



New Stokes Vacuum Gauge

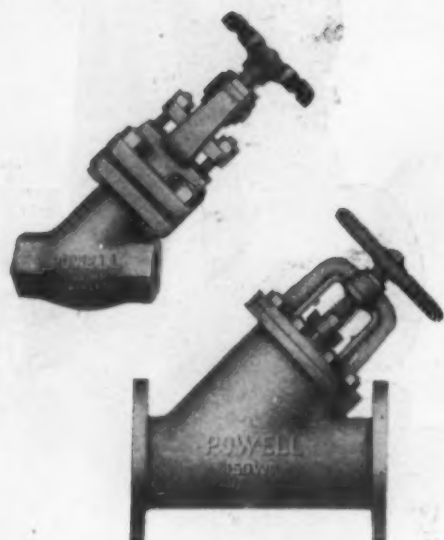
Requires no calibration. Accurate Readings in the Presence of Gases and Condensable Vapors.

This new, improved Stokes Portable (McLeod type) Vacuum Gauge provides rapid (2 to 5 seconds) readings within the micron range with permanent accuracy under all conditions. It will not require calibration against other gauges and retains its accuracy in the presence of all gases including hydrogen, and condensable vapors including water.

PROCESSING EQUIPMENT

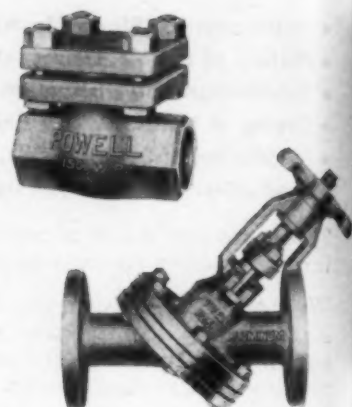


Ask POWELL for to all your



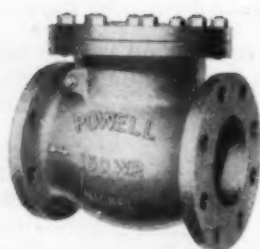
Ask POWELL for
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Dependable Valves Since 1846
CINCINNATI 22, OHIO



POWELL makes a
complete line in
pure metals and
special alloys for
Corrosion Service.

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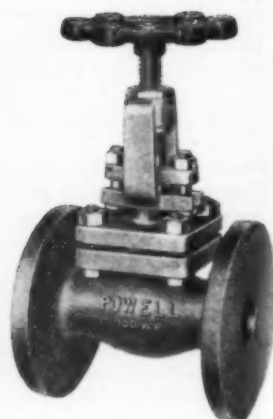
POWELL makes a
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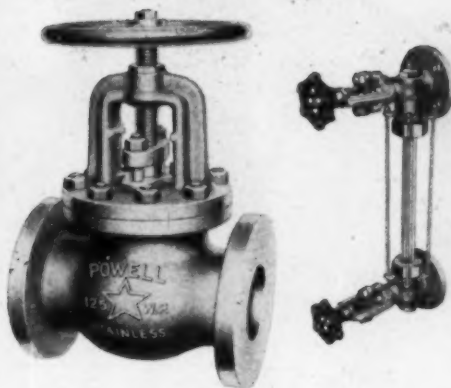
POWELL VALVES

the Answer to VALVE requirements



Ask POWELL for
the Answer to
all your VALVE
requirements

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Dependable Valves Since 1846
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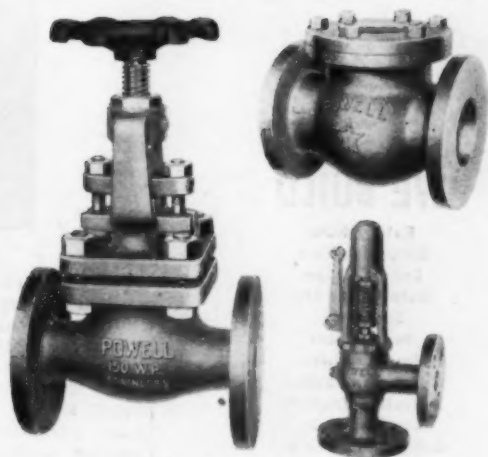
Ask POWELL for
the Answer to
all your VALVE
requirements

THE WM. POWELL CO.
Dependable Valves Since 1846
CINCINNATI 22, OHIO



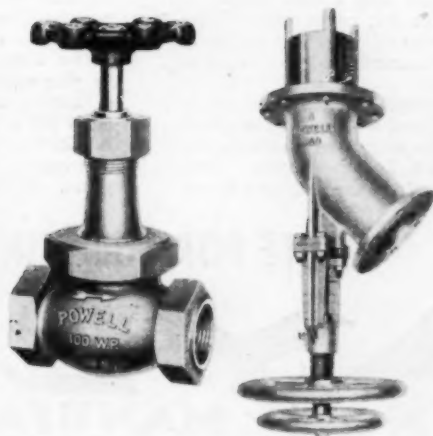
POWELL makes a
complete line in
pure metals and
special alloys for
Corrosion Service.

THE WM. POWELL CO.
Dependable Valves Since 1846
CINCINNATI 22, OHIO



Ask POWELL for
the Answer to
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the Answer to
all your VALVE
requirements

THE WM. POWELL CO.
Dependable Valves Since 1846
CINCINNATI 22, OHIO

POWELL VALVES

A Gold Star, to be added to our Maritime "M" Pennant, has just been awarded us for continued meritorious production performance during the last six months.

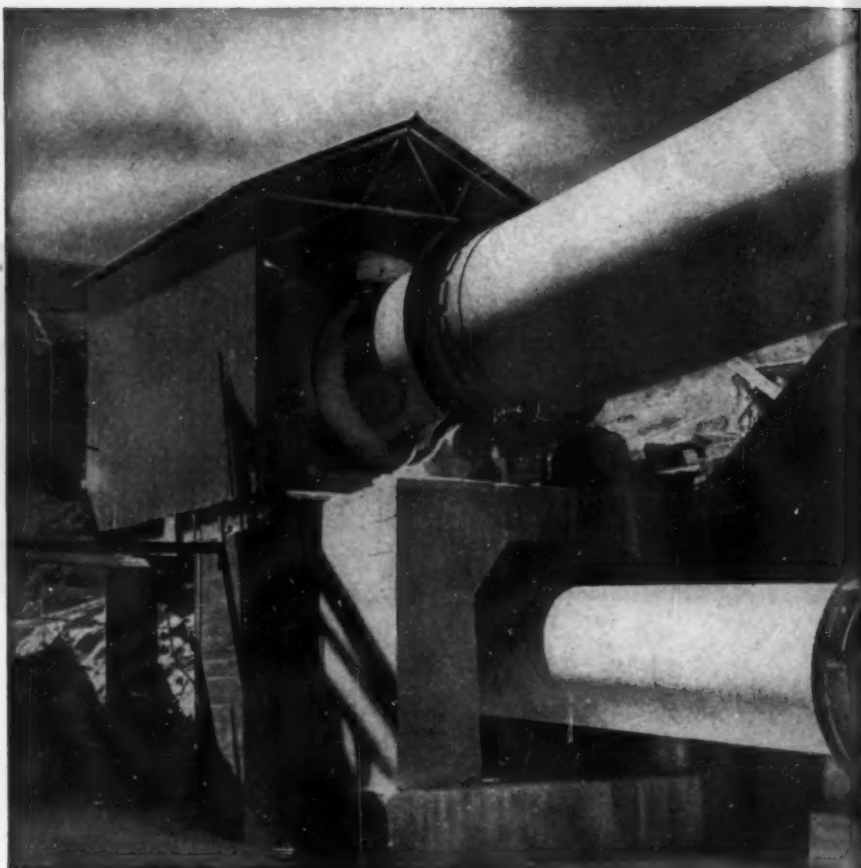
WELDED!

*stiff!
strong!
true!*



WE BUILD

Rotary Kilns
Rotary Coolers
Rotary Dryers
Rotary Slakers
Scrubbers
Evaporators
Jaw Crushers
Gyratory Crushers
Reduction Crushers
Crushing Rolls
Compartment Mills
Ball Mills
Rod Mills
Tube Mills
Pug Mills
Wash Mills
Feeders
Rotary Screens
Elevators



The shells of Traylor Rotary Kilns, Coolers and Dryers are composed of suitable lengths of steel plate scientifically welded by our original welding technique into one continuous tube having the joints so thoroughly fused as to be stronger than the parent metal. The result,—shells literally in one piece, stiff, strong and true, no cumbersome connecting straps, no rivets to "pop," and, best of all, permanent correct alignment. All sizes of units are made in this manner, from a small cooler or dryer to the largest kiln.

Although the strength, stiffness and alignment of the cylindrical shell is of the greatest importance, other exclusive and valuable features distinguish Traylor Rotary Kilns, Coolers and Dryers from the ordinary kinds.

You see, our engineers are constantly engaged in studies of work being done and problems being encountered by operators, and every Traylor unit has built into it the knowledge and experience thus gained. As a result of the advantages mentioned, Traylor Rotary Kilns, Coolers and Dryers are being used and are becoming increasingly popular with the greatest chemical and process companies in America and some elsewhere in the world.

The same construction is used in other Traylor equipment having cylindrical shells,—slakers, scrubbers, ball mills, compartment mills, rod mills, converters and others, in which shell thicknesses range up to 1½".

Investigate these machines,—to your profit. Write us!

WRITE FOR BULLETIN 115

TRAYLOR

ENGINEERING & MANUFACTURING CO.
MAIN OFFICE AND WORKS — ALLENTOWN, PENNA., U.S.A.

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CHICAGO
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SALT LAKE CITY
101 West Second South St.

LOS ANGELES
919 Chester Williams Bldg.

SPOKANE
S. 2707 Rhyolite Rd.

B. C. EQUIPMENT CO., LTD.
551 Howe St., Vancouver, B. C.

Export Department—104 Pearl St., New York City. Foreign Sales Agencies: London, Lima, Rio de Janeiro, Buenos Aires, Santiago, Antofagasta, Oruro, Montevideo.



OCTOBER
7

*"Went on Stream
Like a
Topping Unit"*



First
COMMERCIAL
T.C.C. UNIT

T.C.C. UK
Now on Stream

**THE
WAR-TIME PROCESS
WITH THE
PEACE-TIME
PAYOFF**

LUMMUS
PETROLEUM REFINING PLANTS

HOW TO SAVE CHROMIUM WITHOUT LOSING *needed* CORROSION RESISTANCE

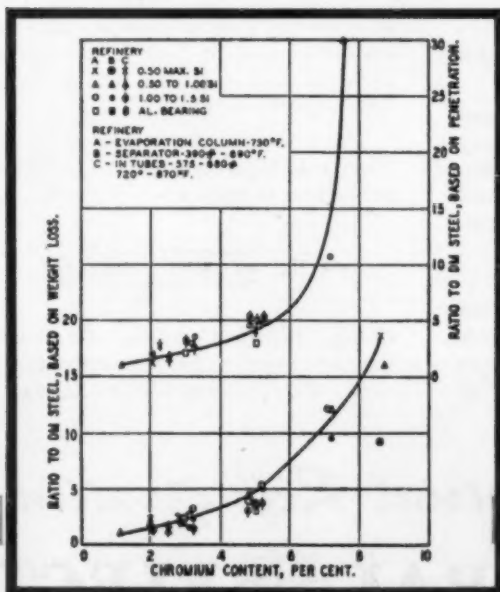
Before the war, the trend was toward use of higher chromium content in cracking still tubes to increase corrosion resistance and prolong equipment life. To assist in the selection of a proper chromium content for a given application, considerable data were accumulated and, as shown in the Figure, corrosion resistance in hot petroleum products is primarily a function of chromium content. A 7% chromium steel is about twice as resistant as a 5% chromium steel,

and a 9% chromium steel about twice as resistant as a 7% chromium steel.

Because it is necessary to conserve chromium, engineers are asked to design cracking units for shorter life periods. For example, (see relationship in Figure) if 5 Cr Mo is giving a life of 10 years then a 2 Cr Mo steel should be satisfactory for nearly 2 years, and a 3 Cr Mo steel for about 5 years.

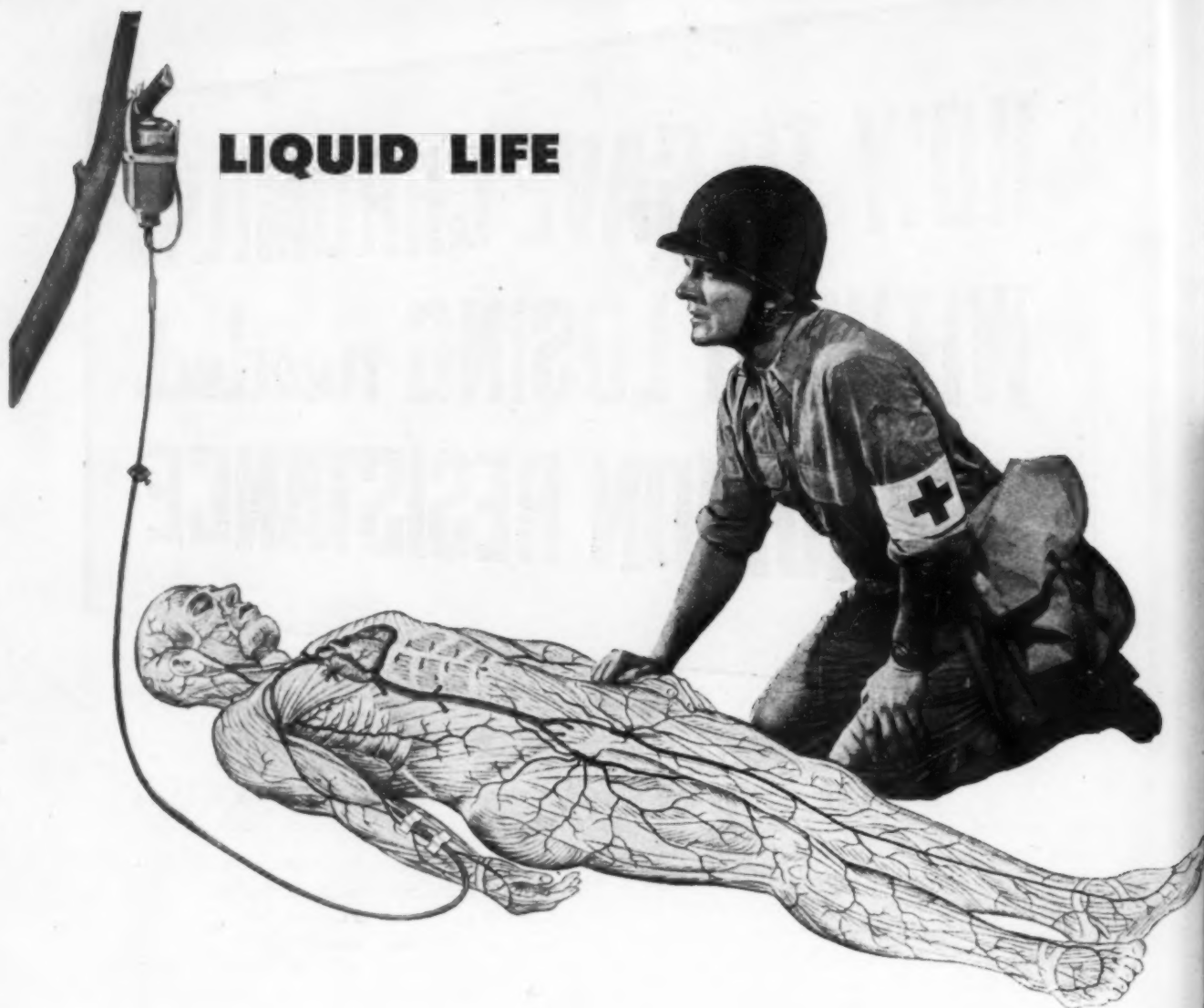
But in using data of the type shown in the figure, it must be remembered that corrosion conditions may vary greatly in different applications. Certain of these differences have been largely eliminated by the method of plotting used, that is, by expressing the corrosion resistance as a ratio to a 1.25% Cr steel. Nevertheless, it would be well for designing engineers to give careful consideration to corrosion conditions before resorting to the lower alloy steel.

Data in our files may assist you in the selection of the proper lower alloyed steels. It is yours on request. Steel & Tube Division, The Timken Roller Bearing Company, Canton, Ohio.



Corrosion Resistance in Hot Petroleum Products Versus Chromium Content.

TIMKEN
TRADE-MARK REG. U. S. PAT. OFF.
SEAMLESS STEEL TUBES



Not bullets, but *surgical shock*, has killed many a soldier in the wars of the past.

Shock is a breakdown of the blood circulatory system. Blood vessels contract. Circulation slows down, almost stops. If shock is too severe, death results.

Today, when a soldier is wounded, blood *plasma* is injected into his circulatory system. The plasma acts as a sort of pump primer . . . fills up the collapsed veins and arteries . . . starts the system working again. By thus counteracting shock, plasma saves lives and reduces suffering.

The whole blood you give at a Red Cross blood donor station goes through much processing before it gets to the front as plasma. At many points throughout the

processing accurately-controlled *refrigeration* must be used.

To provide this refrigeration, General Electric has developed dependable refrigerating equipment that is more efficient, more compact and more flexible—to meet difficult war conditions.

This is only one of the many ways General Electric Refrigeration and Air Conditioning are helping to make a better world.

☆ BUY WAR BONDS ☆

General Electric Company, Air Conditioning and Commercial Refrigeration Divisions, Section 4312, Bloomfield, New Jersey.

Industrial Refrigeration by
GENERAL  ELECTRIC

Hear the General Electric Radio Programs: The "HOUR OF CHARM," Sunday 10 P. M., E W T, N B C . . . "THE WORLD TODAY" News, Every Weekday 6:45 P. M., E W T, C B

In dyeing and finishing...it pays to take the all-important first step with RHOZYME D-200

THE all-important first step in wet processing of fabrics is proper preparation for dyeing and finishing. Make sure the first step is right . . . desize with RHOZYME D-200.

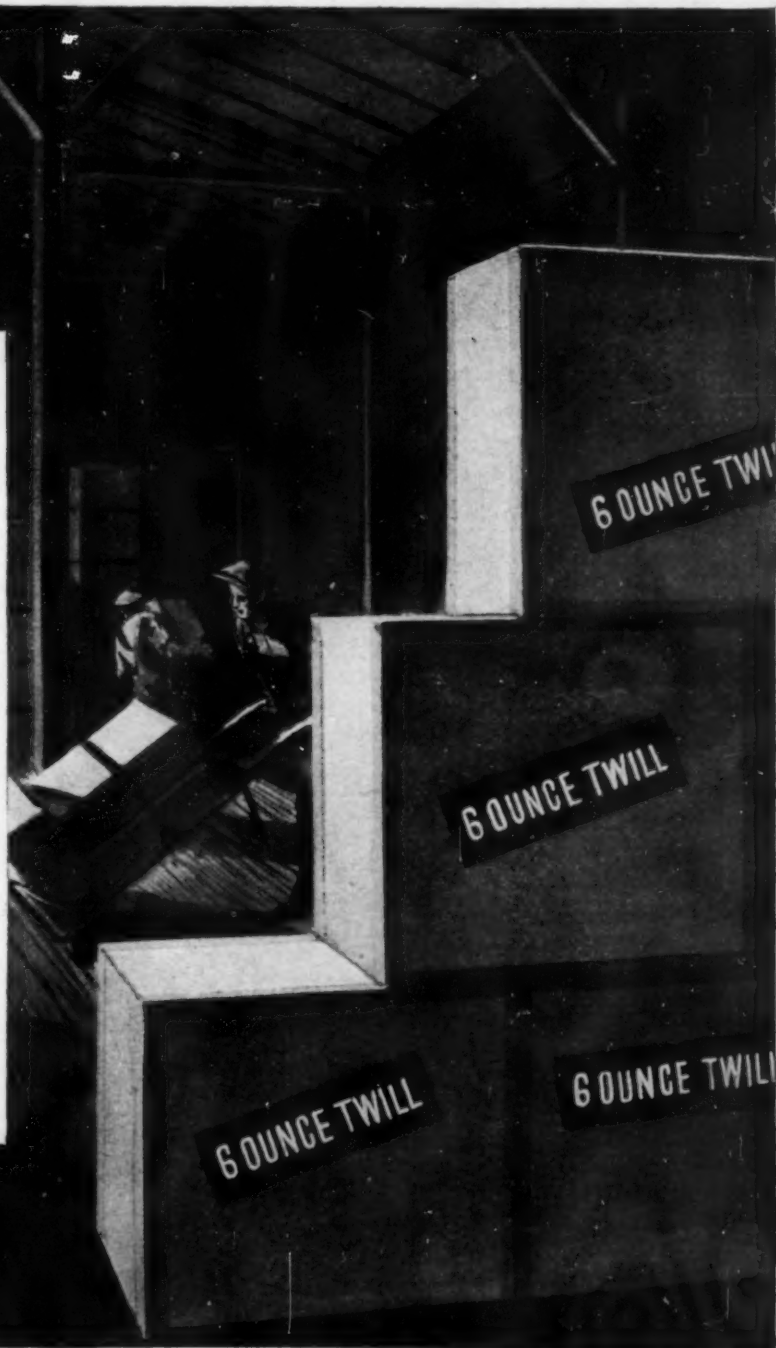
In addition to consistent results, RHOZYME D-200 offers new desizing economies. It is ten times as strong as DEGOMMA 20-F, the first Rohm & Haas textile enzyme introduced in 1930. For maximum efficiency, use RHOZYME D-200 and TRITON W-30.

RHOZYME D-200 has an unusually wide application for desizing, meeting changing styles and conditions with the same assured results. Ask to have one of our technical representatives call to discuss this new enzyme with you.

RHOZYME, DEGOMMA and TRITON are trade-marks of Rohm & Haas Company, Reg. U.S. Pat. Off.



3 awards to Rohm & Haas Company and its associated firms, The Resinous Products & Chemical Company and Charles Lennig & Company.



ROHM & HAAS COMPANY

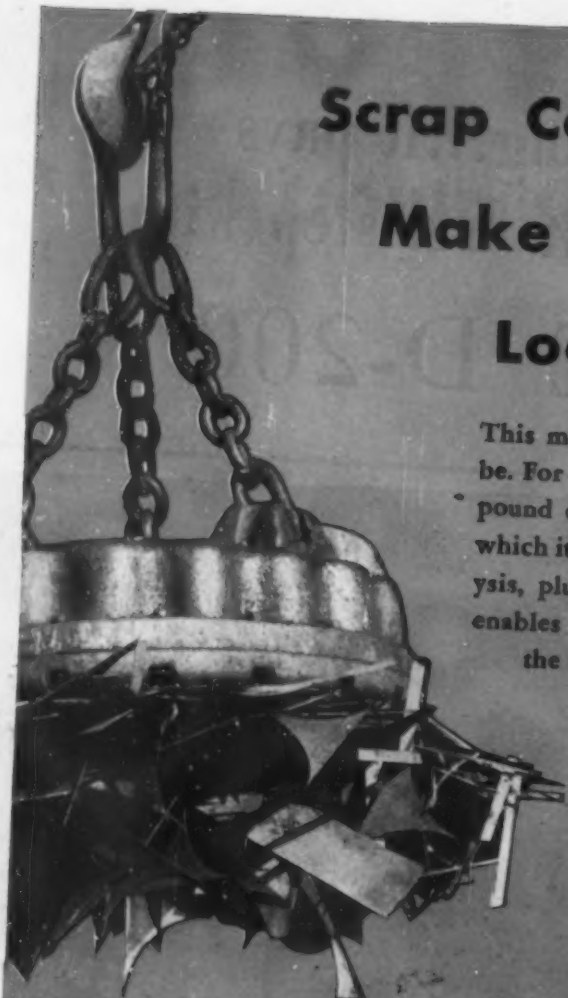
WASHINGTON SQUARE, PHILADELPHIA, PA.

Manufacturers of Chemicals including Plastics . . . Synthetic insecticides . . . Fungicides . . . Enzymes . . . Chemicals for the Leather, Textile and other Industries.

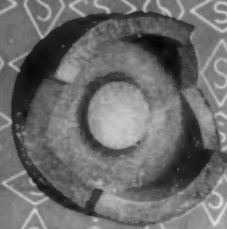


Scrap Control Helps Make Worth Looking For...

This man is fussy. Sivyer pays him to be. For it's up to him to see that every pound of scrap is OK for the job on which it will be used. Laboratory analysis, plus careful scrap classification, enables the melter to know exactly the chemical and physical characteristics of the scrap at his disposal. Thus, at Sivyer, every furnace charge is a controlled charge; quality in every Sivyer casting is controlled quality.



SIVYER STEEL CASTINGS

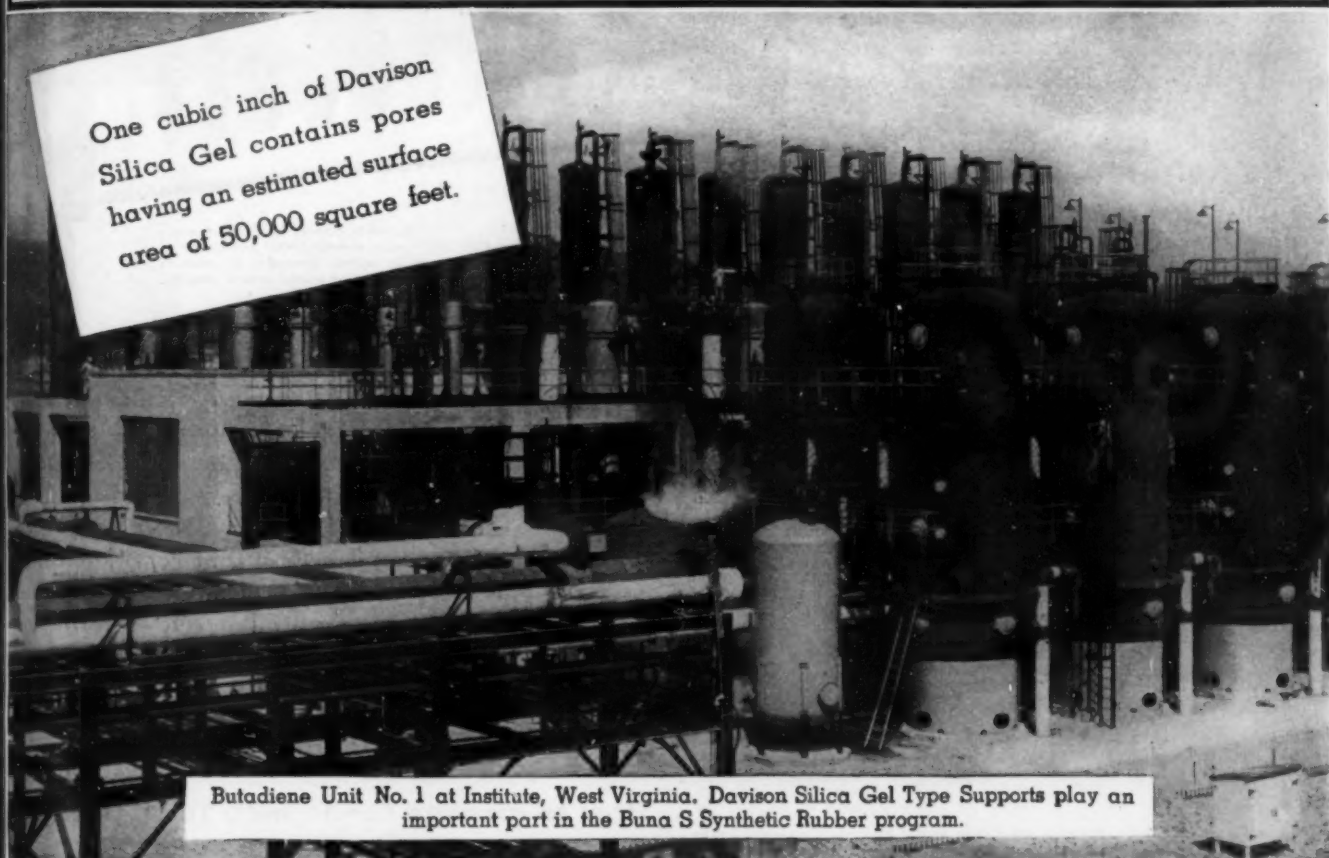


SIVYER STEEL
CASTING COMPANY
MILWAUKEE  CHICAGO 

SURFACE AREA

**IS A BASIC CONSIDERATION IN
THE CHOICE OF A CATALYST SUPPORT
ASTOUNDING AREAS ARE OFFERED
BY DAVISON GEL TYPE SUPPORTS**

One cubic inch of Davison
Silica Gel contains pores
having an estimated surface
area of 50,000 square feet.



Butadiene Unit No. 1 at Institute, West Virginia. Davison Silica Gel Type Supports play an important part in the Buna S Synthetic Rubber program.

The American Synthetic Rubber Industry with The Davison Chemical Corporation as co-recipient won the 1943 Award for Chemical Engineering Achievement.

While many metallic oxides and salts act as catalytic agents, the surface of the catalyst exposed to the reagents has an important bearing on the catalytic activity.

It is possible to increase the exposed

area by impregnating Davison's Gels with metallic oxides and salts that are to be used as catalysts.

Davison experience and "know how" include numerous methods of combining active catalysts with gels.

Progress through Chemistry

THE DAVISON **D** CHEMICAL CORPORATION

BALTIMORE 3, MARYLAND

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How to determine more accurately the Corrosion-Resistant materials best suited to your operations

The answer to a new or unusual corrosion problem . . . where previous service information is not available . . . may be predicted with considerable accuracy in your plant by a "SPOOL TEST."

The method, developed by INCO's Technical Service, conforms closely to the A.S.T.M. Recommended Practice for Conducting Plant Corrosion Tests (A.S.T.M. Designation A-224-411). It features spool-type specimen holders which permit tests to be made in operating equipment under actual conditions of service.

Of simple construction and readily obtainable, these spool-type holders are adaptable to a wide variety of plant equipment. Exposure of the different metal specimens—singly, welded, or in galvanic combination—may be made in liquids, vapors or slurries. Test data are obtained at low cost, with a minimum of expert attention.

Compared with improvised testing methods in which

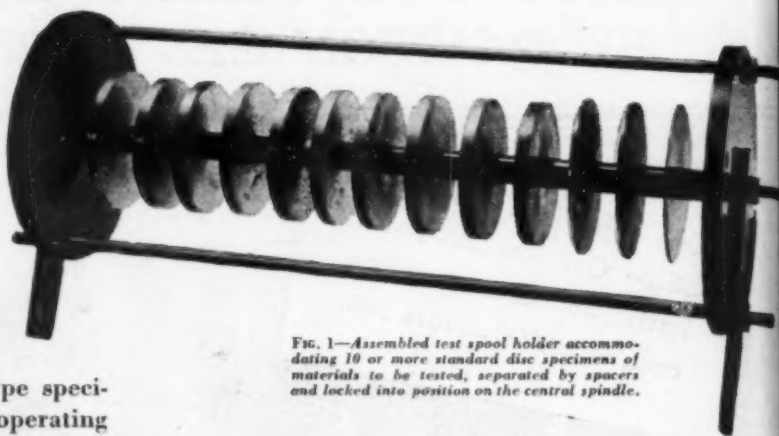


FIG. 1—Assembled test spool holder accommodating 10 or more standard disc specimens of materials to be tested, separated by spacers and locked into position on the central spindle.

significant corrosion factors may be overlooked, INCO Test Spools make corrosion tests more reliable by eliminating errors due to such factors as unsuitable test conditions and non-uniform exposure. Inaccuracies due to accidental galvanic contacts are prevented also.

The test can be conducted without interfering with production and for any length of time considered necessary. Upon completion, the rate of corrosion, and tendencies to pitting, concentration-cell corrosion or galvanic action can be determined for each metal tested.

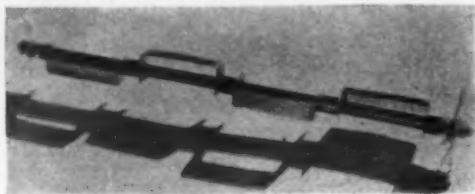


FIG. 2—Modified spool type holder for corrosion testing inside pipes as small as 1 1/4 inch inside diameter. Strips are substituted for the standard discs. Does not seriously impede liquid flow.

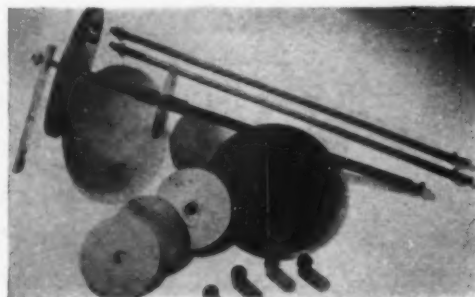


FIG. 3—Group of specimens and insulators used in spool type holder for testing corrosion.

How to arrange for an INCO Test Spool

Testing is often unnecessary, since INCO Corrosion Data Files contain data from more than 2,000 plant tests on more than 40,000 metal and alloy specimens. These files cover hundreds of other materials in addition to INCO's own products . . . Monel, Nickel and Inconel. To determine whether or not a test must be made, all factors of the problem should be assembled, preferably on an INCO Corrosion Data Work Sheet and sent to INCO Technical Service.

If a test is advisable, a test-spool is assembled with suitable specimens. It is then installed either by an INCO Technical Service representative or by your own engineers.

An A.S.T.M. paper "Corrosion Testing Methods," which gives more detailed information about this test method is available—write for Technical Bulletin T-10. Copies of the Corrosion Data Work Sheet will also be sent on request. The International Nickel Company, Inc., 67 Wall Street, New York 5, N. Y.

INCO NICKEL ALLOYS

MONEL • "K" MONEL • "S" MONEL • "R" MONEL • "KR" MONEL • INCONEL • "Z" NICKEL • NICKEL

Sheet...Strip...Rod...Tubing...Wire...Castings

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STALWART, WAR-TIME POWER

American-made motors and generators have met the two and three shift requirements of war industry, with an astounding record of trouble-free performance.

A sizeable proportion of these bear the Crocker-Wheeler name . . . quite a few of them are older than the operators of the machines they serve. For Crocker-Wheeler motors and generators, for over 50 years, have been carefully and durably built.

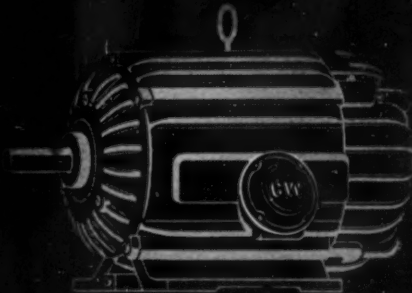
CROCKER WHEELER ELECTRIC MANUFACTURING CO.
 Ampere, N. J. • Division of **JOSHUA HENDY IRON WORKS**

For engineering and service information, call . . .

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*Chicago	(FRA 1616)	Philadelphia	(WAL 1444)
Cincinnati	(MA 1345)	Pittsburgh	(AT 9818)
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. . . or your local Crocker Wheeler dealer

* Local Stock



Be SURE . . . with **CROCKER WHEELER**

Other **JOSHUA HENDY IRON WORKS** factories at Sunnyvale, Pomona, Torrance, and Long Beach, California, and St. Louis, Mo.

Corrosion Proofing Concrete

* "About two years ago, we painted concrete piers and beams that were subjected to Muriatic Acid fumes with Prufcoat and to date we have noticed no further deterioration of the concrete."



Report from one of America's largest chemical manufacturers. Name upon request.



To corrosion-proof concrete, the protective coating used must be proof against the alkali-reaction of the concrete — as well as acid-proof. This explains why Prufcoat Protective Coatings have been able to perform the heretofore thought impossible miracle of corrosion - proofing concrete,

bricks, masonry, stone, etc., as well as metals and less troublesome surfaces. For the Prufcoat film is both acid-proof and alkali-proof — has virtually a zero acid number, zero saponification number and water absorption rate. Made from a special combination of synthetic resins and inert pigments, Prufcoat is applied by brush (by your own maintenance crew), and dries by evaporation of the volatile solvents. Subsequent polymerization (only a matter of hours) provides a tough, non-oxidizing, completely acid, alkali and water proof film. The Prufcoat vehicle is crystal clear and contains no drying oils, wax, stearates or bitumen. Plasticity can be controlled from permanent tackiness to brittleness, as desired.

Prufcoat Protective Coatings are Performance Proved . . .

In corrosion proofing problems involving temperature ranges up to 230° F and chemical agents such as these:

Acetic Acid	Hydrocyanic Acid	Phosphoric Acid
Alum	Hydrofluoric Acid	Salt Solutions
Bleach Solutions	Mineral Oils	Sodium Hydroxide
Calcium Chloride	Muriatic Acid	Steam
Chlorine	Nitric Acid	Sulfonated Oils
Formaldehyde	Oleic Acid	Sulfuric Acid
Flue Gases	Oleum	Tri-Sodium Phosphate

. . . On concrete and steel structures of all varieties, on concrete floors, masonry walls, cement blocks, cinder blocks, brick, stucco, cast stone, etc., on railway tank cars and tank trucks, in ventilating systems, for lining and coating chemical tanks of all kinds, for protecting chemical handling equipment, etc.

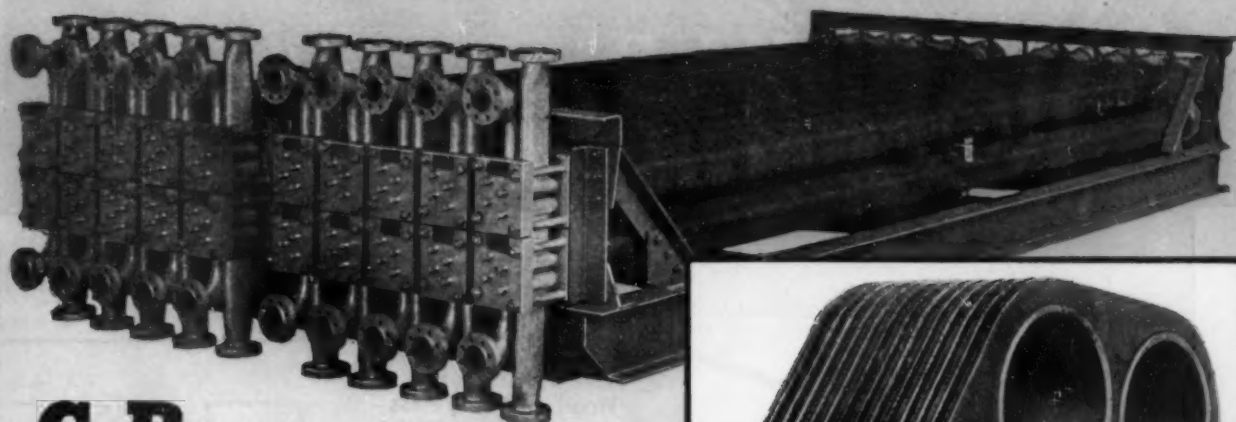
Whatever your corrosion proofing problem may be, the chances are Prufcoat can show you a treatment which has *proved* successful. Write today for descriptive folder.



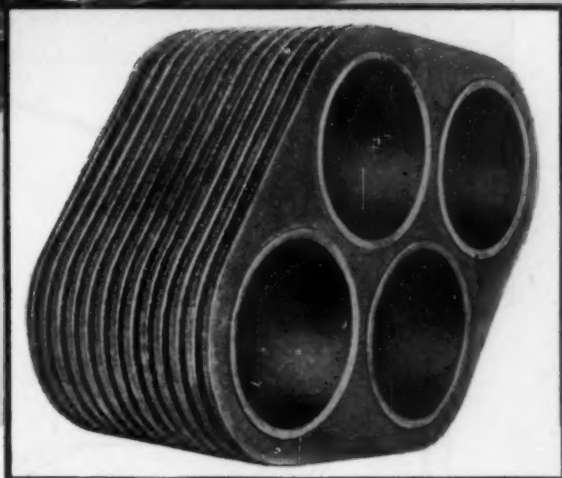
PRUFCOAT

gives Positive Protection against
ACIDS, ALKALIS and WATER!

Prufcoat Laboratories Incorporated • 63 Main Street, Cambridge (42), Massachusetts



G-R TUBEFLO SECTION



... maintains rated heat transfer
with dirty or tarry fluids



The Griscorn-Russell Co.
285 Madison Avenue
New York 17, N. Y.

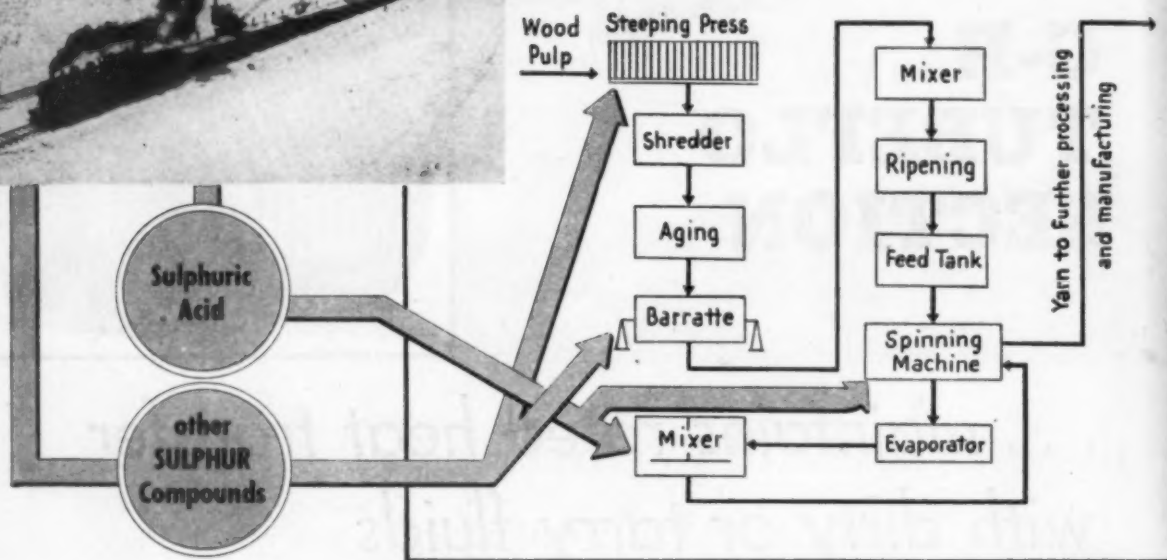
Here is a heat exchanger that resists fouling or clogging because of the large and uniform cross-section of all passages and high velocity of flow. Contamination of fluids is positively prevented, because leakage cannot possibly occur between the two sides of the unit. The design is ideal for high pressures and temperatures, because all fluid passages are reinforced throughout their entire length. These and additional important advantages of the G-R Tubeflo Section have been proven in over 3,500 installed units and by more than 15 years of service records.

Write for Bulletin describing G-R Tubeflo Section features in detail

GRISCOM-RUSSELL

Pioneers in Heat Transfer Apparatus

HOW SULPHUR SERVES INDUSTRY



VISCOSE RAYON

Carbon bisulphide plus cellulose and lye forms a soluble cellulose compound which when precipitated with sulphuric acid yields rayon. Sulphonated oils aid in spinning the fibres, while other Sulphur compounds — Glauber's salt and dyes, color it.

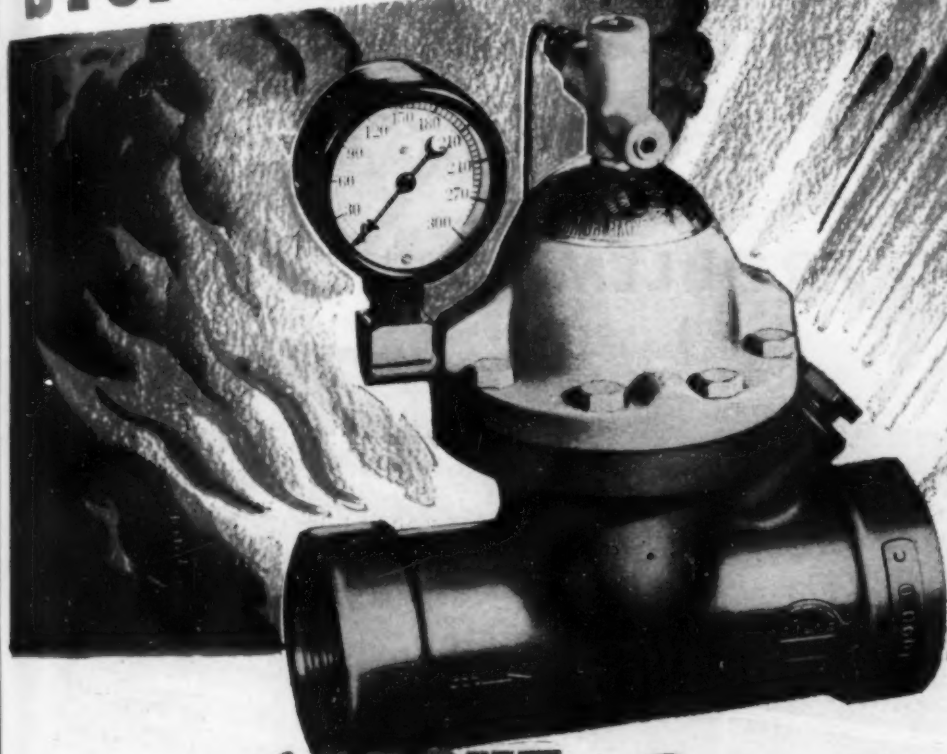
Synthetic fibres, of ever increasing usefulness, owe a great deal to the versatility, availability, and cheapness of Sulphur. Like a cog in the wheel of industry, Sulphur and its compounds mesh with the progressive steps of processing until finally the finished product is evolved. ★ Sulphur, a vital raw material essential to American industry, is abundantly

available to all consumers due to the foresight of the American Sulphur industry. ★ At the Texas Gulf mine alone there is in storage, ready for immediate shipment, sufficient Sulphur to supply the demands of the Nation for a year or more. Modern mining methods keep the rate of production well ahead of shipments.



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STOP FIRE AND EXPLOSION HAZARDS



...with GROVE Automatic STOP VALVES

Fire and explosion hazards resulting from momentary interruption and uncontrolled restoration, or caused by the escape of large volumes of combustible gas due to line fractures or leakage can be eliminated through the use of Grove Automatic Stop Valves. Employed on lines carrying fuel to boilers, ovens, furnaces, on air, acetylene and oxygen supply lines to prevent loss of required system pressure, Grove Valves are designed to automatically stop the flow, operating on rate of flow, differential pressure or on static line pressure. For full details write today for Bulletin 515.

GROVE PRESSURE CONTROL SYSTEMS AND EQUIPMENT INCLUDE:

- ★ AIR, GAS AND STEAM PRESSURE REDUCING VALVES
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- ★ AUTOMATIC REDUCING AND STOP VALVES
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GROVE



Pressure and Flow Control
SYSTEMS & EQUIPMENT

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BRANCH OFFICES: 5644 NAVIGATION BLVD., HOUSTON (11), TEXAS; 30 ROCKEFELLER PLAZA, NEW YORK CITY (20), N. Y.

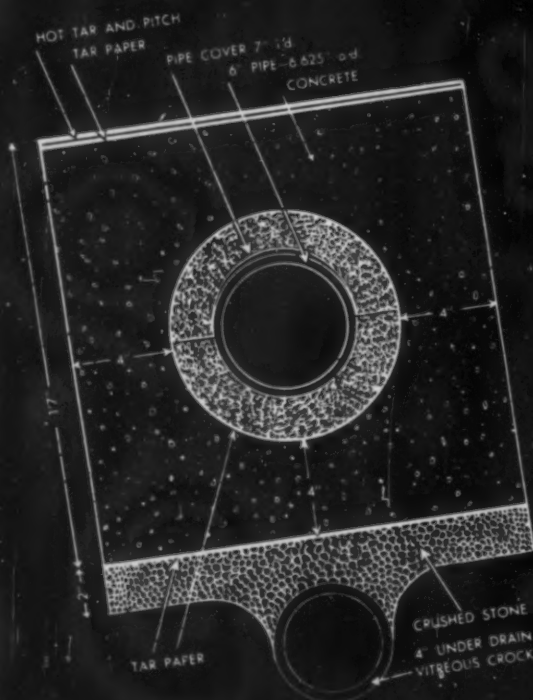
CHEMICAL & METALLURGICAL ENGINEERING • DECEMBER 1945 •

This is the **5TH** in a series of messages

DEALING WITH THE PROBLEMS
IN HEAT INSULATION FACED BY
ENGINEERS AND SOLVED BY
USING **UNARCO** unibestos

5a THE PROBLEM: Permanent insulation of underground steam line.

5b THE SOLUTION:



Dig underground trench to proper grade and lay sewer tile over which two inches of crushed stone is placed. Cover crushed stone with tar paper. Install pipe on wooden blocks arranged to support pipe for welding. After welding apply Unibestos sectional pipe covering to allow free movement of the pipe within the insulation, insulation should have an I. D. approximately $\frac{3}{4}$ " greater than the O. D. of the pipe. Pipes should next be brought to proper grade adjustment after waterproofing the insulation. The trench should be filled with concrete. Tar paper and tar can then be applied on top of the concrete to make the structure waterproof. The great structural strength of Unibestos permits this unique installation. Unibestos is sufficiently strong to withstand the movement and weight of the pipe.

UNION ASBESTOS & RUBBER CO.

GENERAL OFFICES 1821 SOUTH 34TH AVENUE, CICERO, ILLINOIS • NEW YORK • SAN FRANCISCO • PATERSON, N. J.

Why IS THE PHILADELPHIA PLANETARY REDUCER THE RIGHT CHOICE FOR A STRAIGHT LINE DRIVE?

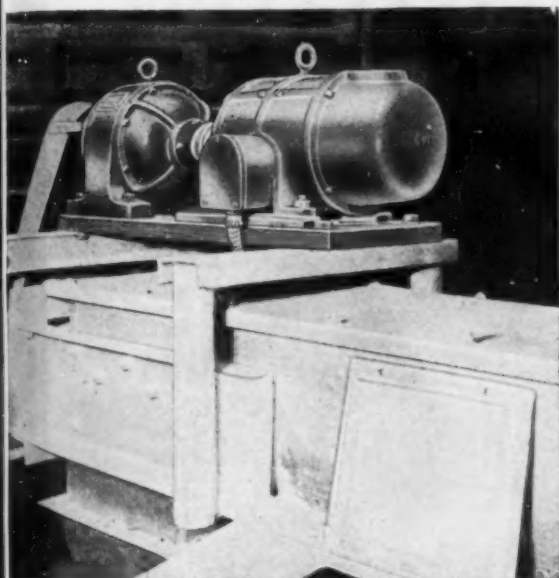
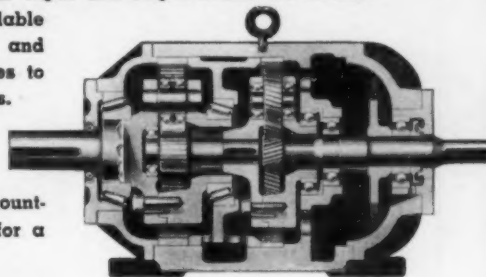
The principle of the Planetary design was proved efficient, dependable and highly practical by Philadelphia MotoReducers. Those complete motor and speed reducer drive units employed the planetary construction. So well have they performed in the past dozen years that a demand was created for the same type of reducer for use where a separate speed reduction unit was indicated. This demand is being met by the Philadelphia Planetary Reducer which embodies the same features, parts and precision manufacture as the MotoReducer.



Philadelphia Planetary Speed Reducers are compact in design yet rugged in construction. Input and output shafts are in line.

These units are available in single, compound and double reduction types to fit a variety of needs.

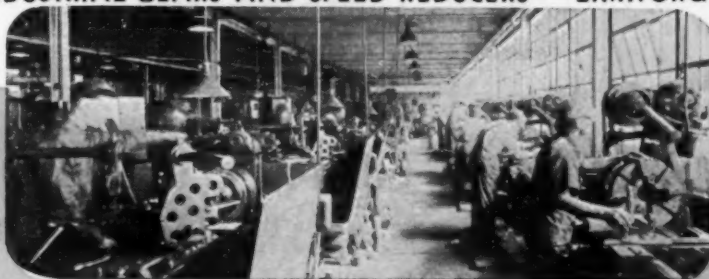
Our catalog 100 gives more complete information and shows various mounting methods. Write for a copy.



PHILADELPHIA GEAR WORKS, INC.

INDUSTRIAL GEARS AND SPEED REDUCERS LIMITORQUE VALVE CONTROLS

ERIE AVENUE & G STREET
PHILADELPHIA 34, PENNA.
NEW YORK, PITTSBURGH, CHICAGO



Philadelphia LIMITORQUE CONTROL

operates all types of valves, etc., safely, economically, from convenient stations.



Philadelphia HERRINGBONE SPEED REDUCER

for heavy loads at high speed. Single, Double, Triple Reductions, various ratios and horsepower.



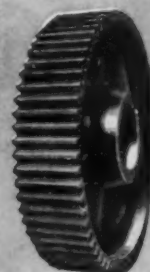
Philadelphia MotoReducer

The economical self-contained drive, Horizontal or Vertical types - various ratios and horsepower.



Philadelphia WORM GEAR SPEED REDUCER

right angle drives - vertical or horizontal. Wide range of ratios and horsepower.



Philadelphia GEARS

All types and sizes of industrial gears. Can be supplied in all materials.

COTTRELL PROCESS

of

ELECTRICAL PRECIPITATION

universally recognized as a
standard method of removing

DUST, FLY ASH, FUME, MIST & FOG
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30 years of research, development and operating experience throughout the
world are incorporated in the

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The ACRYLOIDS give SECOND SIGHT to undersea eyes



ENEMY action may damage the lighting system of a submarine...but instrument dials and companionway markings are instantly illuminated from a source that needs no power supply—the glow of luminescent paints made with the ACRYLOIDS.

The ACRYLOIDS, acrylic resin solutions, are characterized by exceptional transparency and chemical

stability. Because of their chemical inertness, they may be used with a variety of luminescent pigments. And this property of inertness, combined with their transparency, has led to their extensive use in such applications as coatings for maps, valuable documents, aluminum and other sensitive metals . . . particularly for aircraft parts.



3 awards to The Resinous Products & Chemical Company and to its associated firms, Rohm & Haas Company and Charles Lennig & Company.

HELP FOR YOU



*Resin Adhesives
Coatings Resins
Ion Exchange Resins
Paper Resins
Plasticizing and
Modifying Resins*

If you want complete data and assistance in any of these synthetic resin applications, our technical staff will be glad to study your problem without obligation.

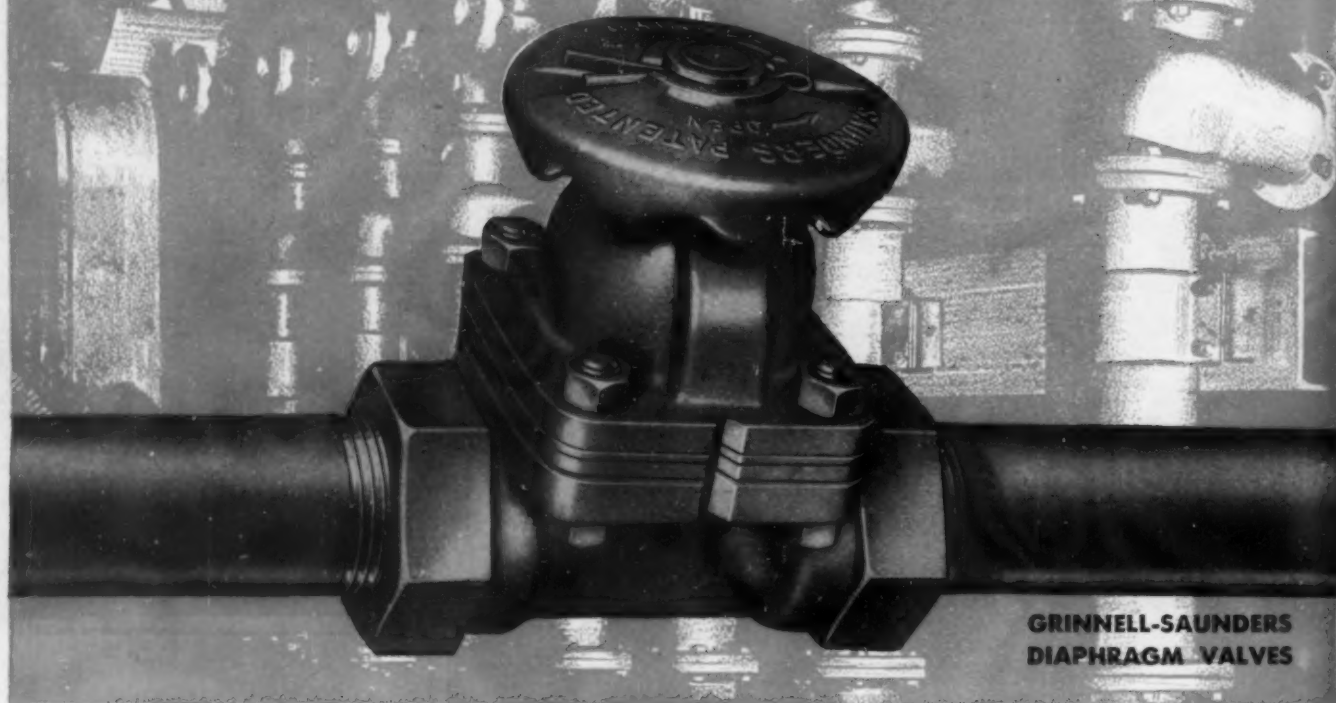
THE RESINOUS PRODUCTS & CHEMICAL COMPANY

WASHINGTON SQUARE, PHILADELPHIA, PA.



FLUID TRANSPORT

"PIPING" .. the Nation's 5th Carrier



**GRINNELL-SAUNDERS
DIAPHRAGM VALVES**

"HOW LONG WILL IT LAST?" is Question No. 1 among specifiers of piping materials for today's process industries. The chemicals to be transported are frequently highly corrosive, so the pipe, valves and fittings selected must be able to withstand their destructive action.

Typical of Grinnell products for this type of service is the Saunders Diaphragm Valve. Its design, permitting a variety of diaphragm materials and body linings to handle each chemical, makes it a long-life valve for process piping. As leading piping engineers and fabricators, Grinnell is furnishing this and other component parts which provide FLUID TRANSPORT in plants producing heavy chemicals, synthetic rubber, food,

drugs and the entire range of petroleum products.

For engineering assistance or piping materials for any type of FLUID TRANSPORT, call Grinnell Company, Inc., Executive Offices, Providence, R. I. Plants and offices throughout United States and Canada.

GRINNELL

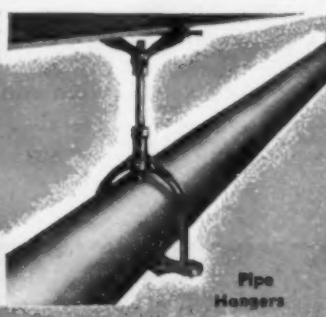
WHENEVER
Piping
IS INVOLVED



Prefabricated
Piping



Pipe and Tube Fittings



Pipe
Hangers



Gas Spring Hangers

GATEWAY TO PROGRESS

In early times, the Old Fort at Niagara was a strategic portal to the vast unexplored West. Scene of many historic episodes, this outpost was a landmark in man's pioneering quest for a new and better world.

Yet the modern Niagara area is an even greater tribute to the efforts of the pioneers. For it is today one of the great industrial areas of the world. Built up by later generations of pioneers in manufacturing and hydro-electric power derived from the Falls, it is the source of tremendous quantities of chemicals

and other important materials with which the America of today is defending the freedom of men throughout the world. As a leading chemical manufacturer in this area, Niagara Alkali Company is using all of its long and valuable experience and modern production facilities to increase the volume and improve the quality of such vital materials.

•
CAUSTIC POTASH • CAUSTIC SODA • PARADICHLOROBENZENE
CARBONATE OF POTASH • LIQUID CHLORINE



Essential Part Of America's
Great Chemical Enterprise



Niagara ALKALI COMPANY
60 EAST 42nd STREET, NEW YORK 17, N. Y.

T

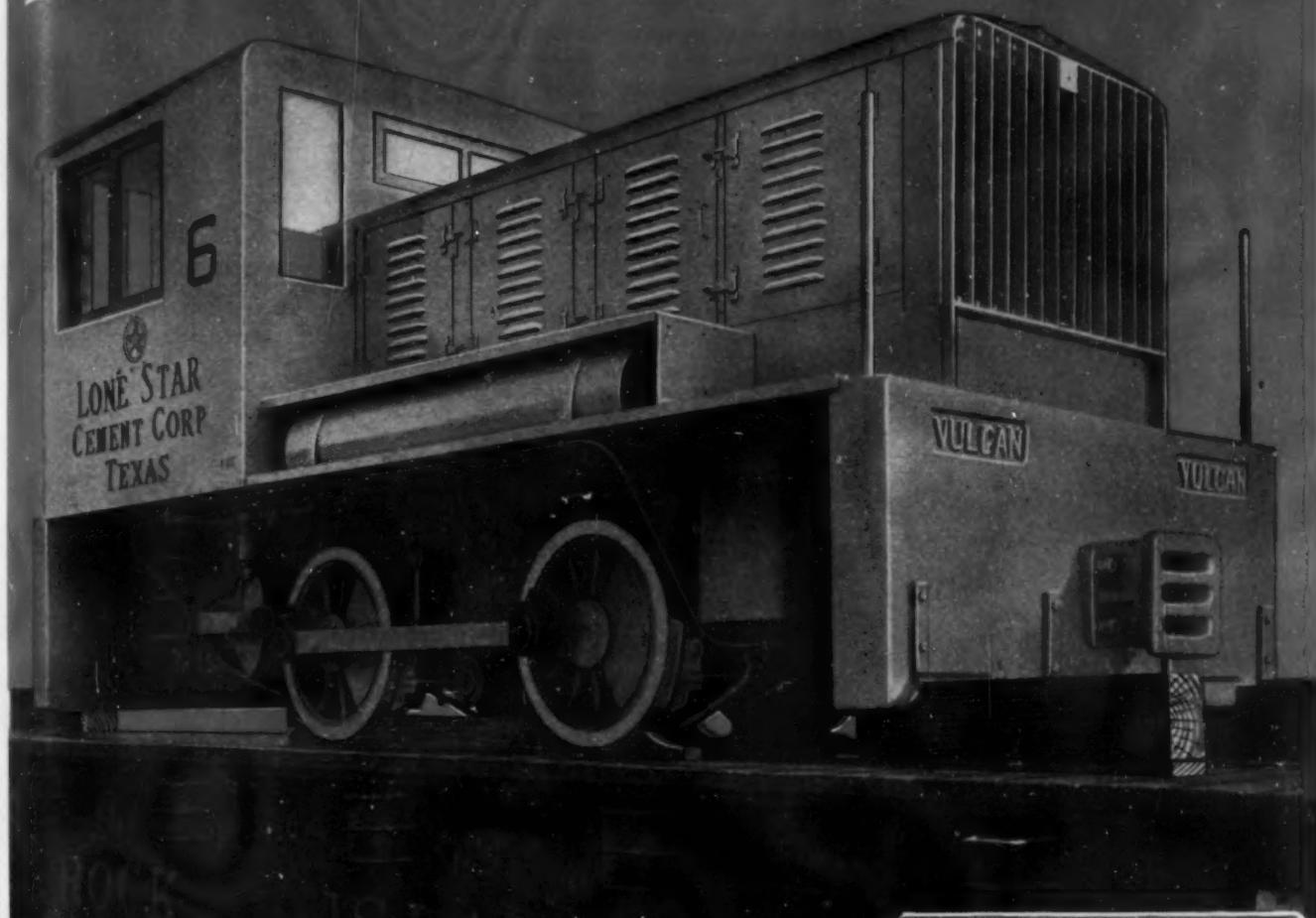
Loco
mod
Vulc
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Like
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expe
Tran
rega
prom



CHEM

Three More **VULCAN DIESEL** Locomotives for "Lone Star Cement"



THE illustration above shows one of three 20-ton Vulcan Diesel Locomotives recently shipped to the Lone Star Cement Corporation's modern plant at Harrys, Texas—reinforcing more than a score of older Vulcan locomotives already in service at Lone Star plants throughout the United States and other countries.

Like many other great industrial corporations Lone Star has relied on Vulcan Locomotives for many years and found them dependable in every respect. One good reason for this wide-spread preference by discriminating users is the longer service life and lower maintenance expense assured by Vulcan's distinctive Constant-Mesh Spur-Gear Transmission, which eliminates all possibility of gear-stripping. Details regarding this and other superior Vulcan features will be furnished promptly on request.

Vulcan Iron Works, Wilkes-Barre, Pa.
New York Office, 50 Church St.

DIESEL AND GASOLINE LOCOMOTIVES

Constant-mesh, spur-gear transmission with separate final drive and reverse assembly. 6 to 35 tons

DIESEL-ELECTRIC LOCOMOTIVES

Most modern design and equipment throughout. 25 to 80 tons

STEAM LOCOMOTIVES

All Industrial types and sizes

ROTARY KILNS, COOLERS AND DRYERS

ROTARY RETORTS, CALCINERS, ETC.

CRUSHING ROLLS, PULVERIZERS AND GRINDING MILLS

BRIQUETTING MACHINES,

Heavy-duty double-roll type

ELECTRIC HOISTS, CAGES, SKIPS, ETC.

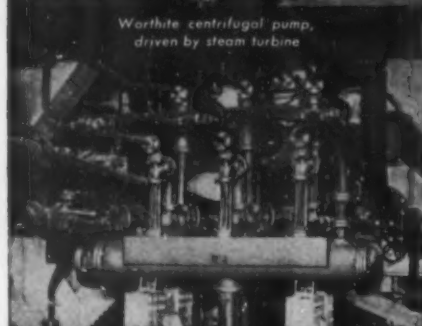
CAST-STEEL SHEAVES AND GEARS

SHAKING-CHUTE AND CHAIN CONVEYORS

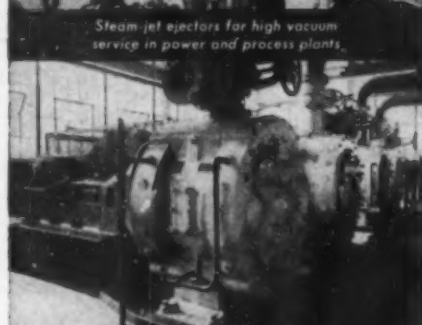
STEEL CASTINGS AND SPECIAL MACHINERY



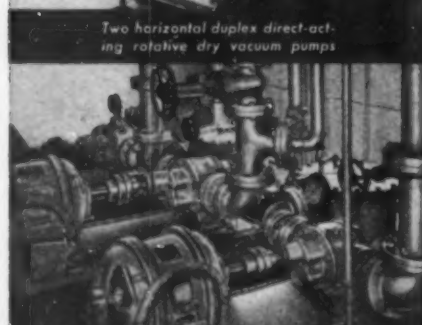
Worthite centrifugal pump,
driven by steam turbine



Steam jet ejectors for high vacuum
service in power and process plants



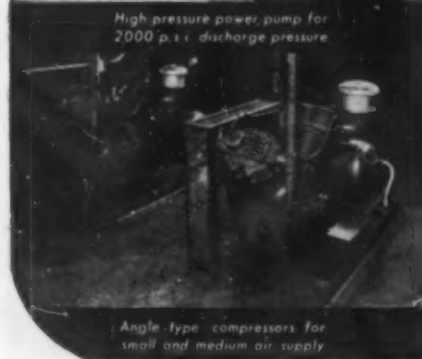
Two horizontal duplex direct-acting
rotative dry vacuum pumps



Rotary pumps, for non-
abrasive viscous chemicals



High pressure power pump for
2000 p.s.i. discharge pressure



Angle type compressors for
small and medium air supply

WORTHINGTON **EQUIPMENT FOR THE CHEMICAL INDUSTRY**

CENTRIFUGAL CHEMICAL PUMPS

For acids, alkalis, solvents and process work.

CENTRIFUGAL GENERAL SERVICE PUMPS

For industrial, power plant, process services.

TURBINE WELL PUMPS

For water supply, drainage, sump, other services.

STEAM PUMPS

All types, horizontal and vertical.

POWER PUMPS

Hydraulic press, boiler feed, varied services.

ROTARY PUMPS

For transfer of non-abrasive liquids.

AIR AND GAS COMPRESSORS

All types, sizes and drives.

REFRIGERATING AND AIR CONDITIONING EQUIPMENT

All types, including NH₃, Freon-12, CO₂, etc.;
compression, absorption, steam-jet and centri-
fugal refrigeration.

STEAM CONDENSERS

Surface, barometric and low-level jet types.

STEAM-JET EJECTORS

For moderate to high vacuum.

VACUUM PUMPS

Rotative dry type.

Direct-acting wet type.

FEEDWATER HEATERS AND DE-AERATORS

Open type; for individual requirements.

WATER PURIFICATION EQUIPMENT

Pressure and gravity type filters.

DIESEL ENGINES

GAS ENGINES

Horizontal and vertical types.

CONVERTIBLE GAS-DIESEL ENGINES

Convertible from gas to diesel fuel.

STEAM TURBINES

All types, for generator and equipment drives.

SPEED CHANGE GEARS

Reducing and increasing.

V-BELT DRIVES—(Multi-V-Drive)

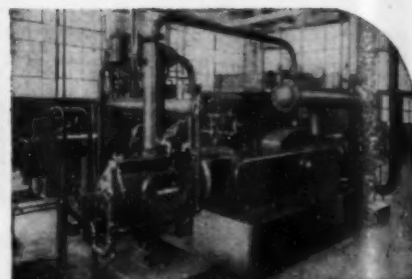
Complete drives, sheaves or belts only.

LIQUID METERS

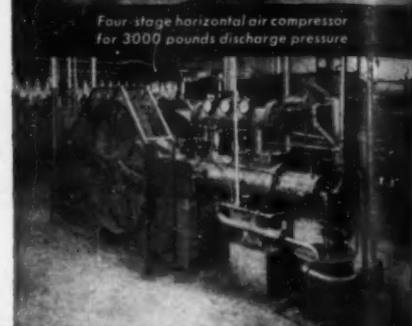
For chemicals, hot or cold water, etc.

PORTABLE COMPRESSORS AND AIR TOOLS

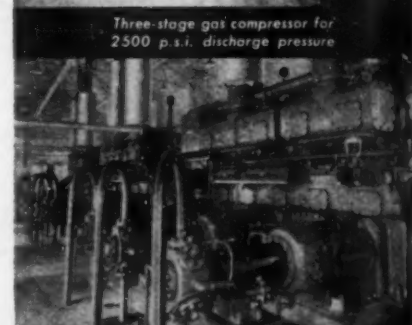
For general plant maintenance.



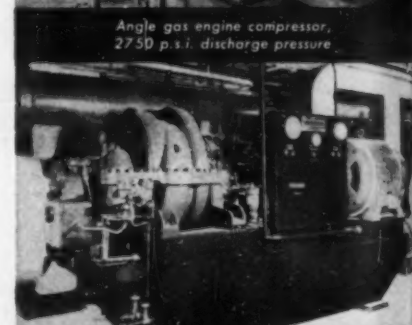
Four-stage horizontal air compressor
for 3000 pounds discharge pressure



Three-stage gas compressor for
2500 p.s.i. discharge pressure



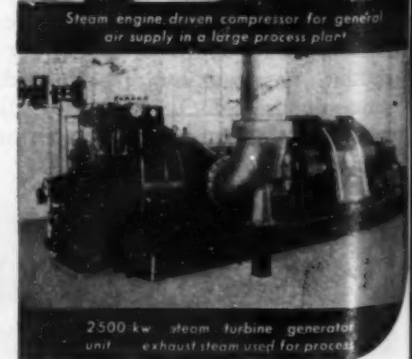
Angle gas engine compressor,
2750 p.s.i. discharge pressure



Centrifugal refrigerating compressor, water
cooler, water-cooled condenser combined



Steam engine-driven compressor for general
air supply in a large process plant



2500-kw steam turbine generator
unit exhaust steam used for process

A complete coverage for every
important chemical plant function

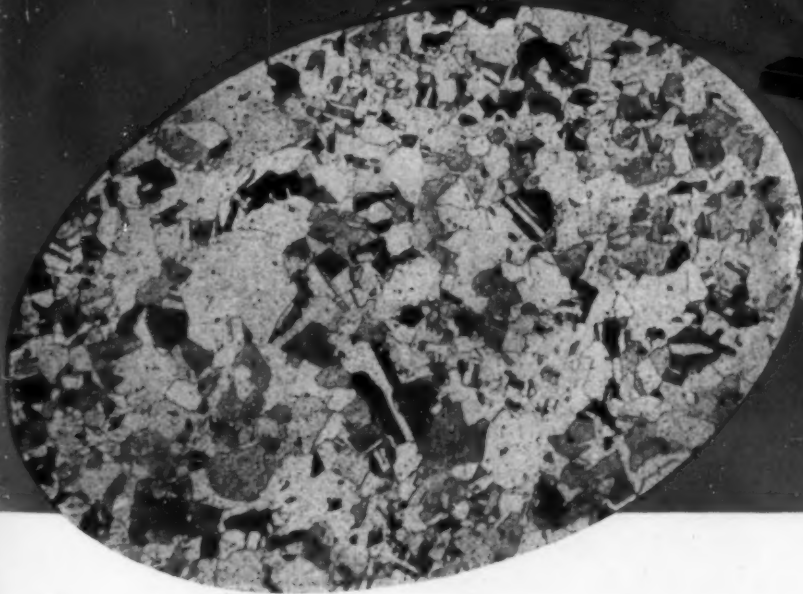
**WORTHINGTON PUMP AND
MACHINERY CORPORATION**

General Offices: HARRISON, NEW JERSEY

Offices and Representatives in Principal Cities

1C3-4A

BECAUSE OF SUPERIOR QUALITY
Trent-Welded Stainless Tubes
 ARE PLAYING A DRAMATIC PART
 IN THE WAR TO SPEED VICTORY



← Cross section through the weld zone at 100 diameters. The refinement of the weld and parent metal is even more evident at this high magnification.

- But we are planning for **PEACE!**

Trent-Welded Stainless Tubes can be invaluable not only in streamlining and modernizing your product, but also in increasing the efficiency and safety in handling the products for which your machine will be designed. TRENT-WELDED Stainless Tubes are proving their worth in war; they will do a far better job in peace.

Due to a new method of automatic weld control, we have successfully made well over a million feet of welded and cold drawn tubing. By this method of welding, the heat-affected zone is held to a minimum resulting in a very homogeneous weld. When cold drawn and annealed, the structure of the weld is almost identical with that of the base metal.

In addition to the conventional range of sizes, our welding methods are especially adapted to the manufacture of large diameter (up to 18" O.D.) and as light as 22 gauge tubing.

→ A 6" O.D. x .043 wall stainless steel tail pipe, 10 feet long, used in the aircraft industry.

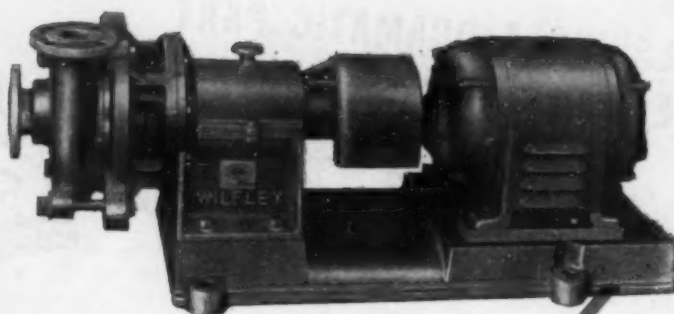
→ A coil formed from our stainless steel tubing. Note the smooth bends and the ease with which straight chrome tubing can be fabricated.



TRENT TUBE MANUFACTURING COMPANY **EAST TROY, WISCONSIN**

Detroit Office: 805-806 New Center Bldg.

Let us supply you with complete information about our product. Our technical staff will gladly assist manufacturers in adjusting their tubing specifications to meet their requirements.



Chemicals...

IN RECORD-BREAKING VOLUME

Peak production is *normal* production in many hard-driven chemical plants now... and in such plants WILFLEY Acid Pumps are at their best. Acids, hot liquids, mild abrasives, corrosives are smoothly handled by the pump *without a stuffing box*—the pump that frees your plant from stuffing box troubles. Perfect performance on both continuous and intermittent operations. Effective sealing blades. No rubbing contact. 10- to 1,000-G.P.M. capacities. 15- to 125-ft. heads and higher. Buy WILFLEY for increased production without interruption. Write for details.

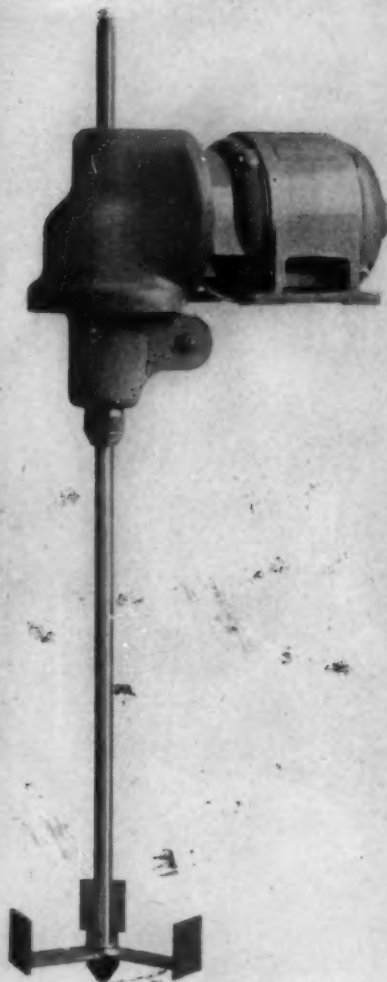
A. R. WILFLEY & SONS, Inc.

DENVER, COLORADO • U.S.A.

New York Office: 1775 Broadway, New York City

WILFLEY

THE DEGREE AND
TYPE OF AGITATION
CAN BE FURNISHED
TO MEET THE
MOST EXACTING
CONDITIONS



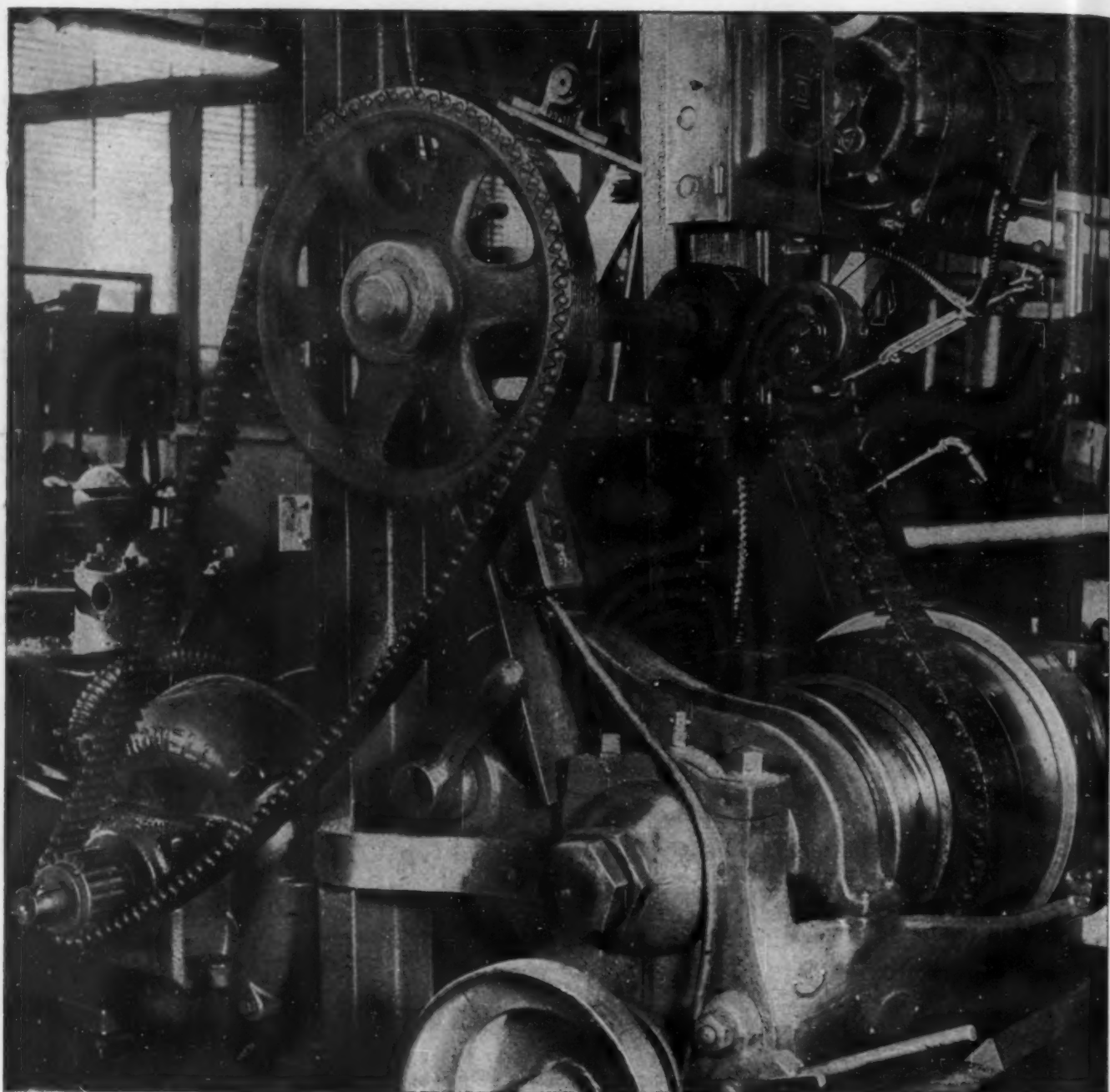
**STRUTHERS
WELLS**
Radial Type
**PROPELLER
AGITATORS**



STRUTHERS WELLS CORPORATION
PROCESS DIVISION
WARREN, PENNSYLVANIA

The agitator is made from three simple parts—hub, supporting arms, and agitating blades. The pitch of the blade determines the type of agitation. The degree of agitation can be increased from mild circulation to extreme destructive action with rapid velocity of movement, effective mechanical shearing, and maximum turbulence. Further, the normal RPM at which this agitator operates eliminates the need of expensive gear reduction. Utter simplicity of design saves enormous quantities of critical materials; an important consideration when expensive alloys are required.

PERFORMANCE COUNTS, especially in new products—that is why you will find so many STRUTHERS WELLS Agitators in service in the manufacture of synthetic rubber and other chemical processes that are destined to play such an important part in post-war operations. Let STRUTHERS WELLS Engineers cooperate with you.



MORSE Silent Chain Drives are positive in action. Operating on the principle of *Teeth—Not Tension*, they can't slip . . . can't waste power. Delivering a constantly uniform flow of power, they are more "precise" . . . increase machine output . . . cut scrap costs.

Long-lived, Morse Silent Chain drives are built to "take it" . . . to withstand shock loads and operate unaffected

by oil or grease. Important, too, they save by reducing maintenance and installation time . . . by eliminating the need for frequent replacement, and down-time.



If you have a power transmission problem, concerned with present equipment or new design . . .

chances are it will pay you to talk with a Morse man. Naturally, there will be no cost or obligation on your part.

SPROCKETS

CHAINS

FLEXIBLE COUPLINGS

CLUTCHES

MORSE *Roller and Silent* **CHAINS**

MORSE CHAIN COMPANY • ITHACA, N. Y. • DETROIT, MICH. • A BORG-WARNER INDUSTRY

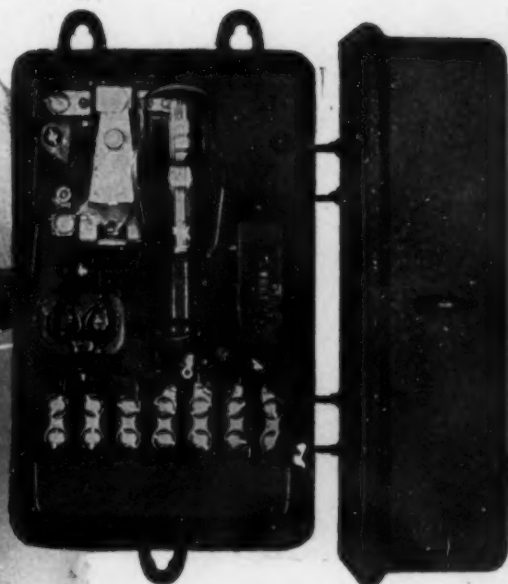
PHOTOSWITCH ELECTRONIC LEVEL CONTROL



PHOTOSWITCH PROBE
(located at Tank)

TODAY, IN HUNDREDS OF INDUSTRIAL AND CHEMICAL PLANTS, MODERN PHOTOSWITCH INSTALLATIONS:

- Control pumps to maintain constant liquid level.
- Provide high and low level safeguards.
- Maintain interface between two liquids.
- Control liquids in mixture, for desired concentration.
- Govern pump programming operations.
- Detect water accumulation in oil or gasoline storage tanks.
- Provide complete boiler feedwater control.



PHOTOSWITCH CONTROL

FLOATLESS Maintains levels *electronically*. Sensitive probe actually "feels" liquids and powders . . . eliminates complicated float and pressure switches.

MAINTENANCE-FREE Electronic operation ends friction — wear. Prevents costly shut-downs . . . solves wartime replacement problems.

CONTROLS ANY MATERIAL Handles acids, oils, resins, alkalis, petroleum products, granular solids or dry powders.

MAINTAINS LEVELS ACCURATELY Electronic principle of operation provides fraction of an inch control.

SAFE WITH COMBUSTIBLES, EXPLOSIVES Only microamperes of current — at low voltage — pass through material under control.

ELIMINATES CORROSION PROBLEMS Only metal rod is immersed in liquid, eliminating corrosion problems encountered with mechanical devices.

EASILY INSTALLED Probe fitting is threaded into tank and wired to electronic control. Probe extends from fitting into tank to desired level.

UNLIMITED LIFE A Photoswitch installation contains no moving parts — nothing to wear out or fail in operation . . . is guaranteed for an unlimited life.

There is a Photoswitch Level Control to meet every need. Write for complete catalogue information.



PHOTOSWITCH INCORPORATED

PHOTOELECTRIC & ELECTRONIC CONTROLS FOR EVERY INDUSTRIAL PURPOSE

CAMBRIDGE, MASS. • District Offices IN ALL PRINCIPAL CITIES

➡ For information on turbidity control . . . smoke density indication . . . timing . . . counting . . . automatic inspection . . . conveyor control . . . machinery safeguards . . . and similar automatic control problems, consult PHOTOSWITCH, INCORPORATED.



This Pipe Line's an Acrobat

These days an army travels on its gas tanks. That's why it's so important for mechanized forces to have portable pipe lines with flexible joints...pipe lines that can do acrobatics.

Ordinarily, you know, pipe lines are buried in the ground and are so rigid that going through rugged terrain requires a lot of real engineering.

But there's no time for that on beachheads and at the front. Pipe lines have to be laid fast...and they can't fail, even if they're strung across rivers, ravines, or deep gullies. They must yield to the force of concussion, yet never leak.

Right there is where Victaulic Coupling equipped with United States Rubber Gaskets come in. They're easily applied. They permit a high degree of leeway in the laying of the pipe lines.

In the invasion of Africa, for example, pipe lines with Victaulic Couplings made it possible for our mechanized forces to be sure of an adequate supply of oil and gasoline while advancing fast and far across rough ground.

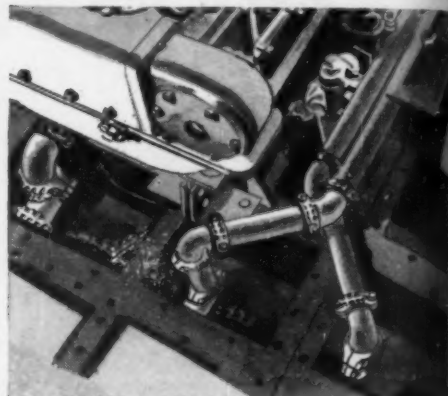
As our armies progress, these rubber elbows in the steel arms that carry essential fuel will play an increasingly important part.

UNITED STATES RUBBER COMPANY

1230 Sixth Avenue • Rockefeller Center • New York 20, N. Y.



GASKETS IN VICTAULIC COUPLINGS molded by United States Rubber are at work in many coal and metal mines far below the earth's surface and on hundreds of ships on the high seas. The gaskets resist a wide range of temperature changes, and can be used with safety on, above, or below the ground.



THE UNITED STATES RUBBER GASKETS in Victaulic Couplings made of synthetic rubber are impervious to the destructive action of high octane fuels. They can be used for pipe lines that convey oil, water, air, sludge!



THE FLEXIBLE SEAL of the flexible joint. Victaulic Couplings provide flexibility in pipe lines made of long lengths of rigid metal pipe. The flexible seal is formed by these gaskets, molded from synthetic rubber.

Listen to the Philharmonic Symphony program over the CBS network Sunday afternoon, 3:00 to 4:30 E. W. T. Carl Van Doren and a guest star present an interlude of historical significance.



FROM THE MEN AND WOMEN OF CLARK BROS.
A HOPE, A WISH AND A PRAYER FOR

Many Happy Returns in 1944

Our hope this Christmas day is for victory in 1944. Our wish is for the happy returns of our boys from the battlefronts of the world. And our prayer is that, as a reward for their sacrifice in war, they may enjoy a full measure of the blessings of peace. May their 1944 Christmas be the kind of holiday they used to know!

—The Men and Women of Clark Bros. Co., Inc.

United
and metal
on hun-
lets resist
can be
ground.

Victaulic
e imper-
ane fuels.
convey oil.

Victaulic
s made of
xible seal
synthetic

over the CBS
F. Carl Van
of historical

NY

ENGINEERING



Complete, Expert LEAD BURNING AND BONDING Service and Facilities

**You Can Have
Your Lead Burning Done Right
... And Done Right Now**

YOU CAN have your lead burning and bonding jobs done right . . . done by experts with years of experience on a wide variety of lead burning and bonding problems . . . and you can have it done right now.

Our two plants are completely staffed with lead burning and bonding experts . . . skilled men who know how to do the best job and do it quickly and economically.

Both plants are fully equipped to handle any size lead burning and bonding job . . . at your plant or ours.

We have handled large jobs and small . . . for prominent companies from coast to coast and in South America. We have the materials, the equipment and the men. We have the "know how" gained in thirty-five years in lead burning and bonding work. Let us work with you.

**Write, wire or phone us about your
lead burning and bonding problems.
We will help you.**

2 COMPLETE PLANTS Ready To Serve You

MIDWEST

901 So. Boyle Ave.
ST. LOUIS, MO.

EAST

Just outside of Boston
Plant at No. Woburn—Office at
691 Massachusetts Ave.
ARLINGTON, MASS.

**Both plants fully staffed and equipped to
do any size lead burning job . . . at your
plant or ours.**

NEW ENGLAND LEAD BURNING CO.

Lead Burning and Bonding Engineers

691 Massachusetts Ave., Arlington, Mass. • 901 So. Boyle Ave., St. Louis

EACH A RECORD BREAKER BUT ONE HAS THE WINNING SPEED AND EFFICIENCY FOR YOU!



Today when time is so vital the three St. Regis Packaging Systems are doing their bit by shaving priceless manhours from the time once required to package an infinite variety of products. Because each of these systems sets new records on the job for which it was specifically designed, St. Regis has no favorite system. Following an on-the-spot survey of your packaging operation, we recommend the system best suited to your product—and your production needs.

The many industries changing over to Multiwall Paper Bags welcome the added protection given their products—and the savings in manpower and money effected by St. Regis Packaging Systems. These

savings can be yours, too, if your product is baggable in rugged, custom-built Multiwalls, and is packed in 25 to 100 lb. units.

VALVE PACK — Maximum Production and Minimum Labor are outstanding features of the St. Regis Valve Pack System. Your product is preweighed by St. Regis Automatic Packing Machines (Belt, Screw or Impeller type) and rapidly propelled into valve type, self closing Multiwall Paper Bags. Gravity Type Packers are available for free-flowing products.

SEWN PACK — Rapid, Uniformly Sift-proof Closures are assured open mouth bag users with the St. Regis Sewn Pack System. Automatic sewing machines ap-

ply a bound-over tape and filter cord, and quickly sew through all plies of the bag. Powdered products cannot work their way through this extra strong closure.

TIED PACK — Greater Economy on Moderate Production is achieved with the St. Regis Wire Tied Pack System. A hand twisting tool constitutes the entire equipment for effecting the securely tied closure around the neck of the bag.

Our experience in solving the packaging problems of varying industries may be of great practical help to you. A St. Regis Packaging Engineer will be happy to specify the type of bag required for your product—and recommend the packaging system best suited to your production needs.

St. Regis Bags are built of 3 to 6 independent walls of specification kraft paper fabricated in tube form, one within the other, so each bears its share of the load. Chemical and physical properties of product determine number and weight of kraft and special sheets.



MULTIPLY PROTECTION • MULTIPLY SALEABILITY

ST. REGIS PAPER COMPANY

TAGGART CORPORATION • THE VALVE BAG COMPANY

NEW YORK: 230 Park Avenue

CHICAGO: 230 No. Michigan Avenue

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Dallas, Tex.
New Orleans, La.
San Francisco, Calif.

Denver, Colo.
Seattle, Wash.
Toledo, Ohio

Why INDUSTRY is looking to WASHINGTON STATE

CHEMURGIC RAW MATERIALS...

The world's largest supply of accessible timber, plus great agricultural areas and mineral deposits, are the base of an inexhaustible supply of raw materials for chemurgic and electro-chemical reduction and treatment. Timber is now being *permanently* cropped under sensible, scientific forestry management methods, with special attention to the recovery of substantial "waste" fractions.

The products, by-products and waste products of Washington State's timber industries alone offer manufacturing opportunities for more than 4,500 articles—everything from building materials, textiles, pulp and paper, to alcohols, protein feeds, lubricants and an endless list of essential chemicals.

ELECTRIC POWER...

Abundant hydro-electric power at the lowest industrial rates in America is provided by Grand Coulee-Bonneville and 64 other public and private generating plants in Washington State. Power is *universally* available throughout Washington State for your reduction and manufacturing processes through a statewide "grid" incorporating all these facilities in a single pooled supply system.

ALL-YEAR WORKING CLIMATE...

In many favored sections of Washington State climatic conditions approach the scientific optimum for *continuous* industrial operations. Lower building construction and plant maintenance costs, economical heating, and minimum absenteeism due to weather interruptions are outstanding characteristics of plant operations in Washington State. The recreational advantages of a mild climate combined with scenic attractions are a natural aid to permanency of employment.

TAX STRUCTURE...

Washington State's tax system is highly favorable to industrial development. The state has no debt, as the outstanding general obligation debt is entirely offset by assets in the sinking fund. Cash surplus of the state was \$64,000,000 at the end of July, 1943. Local government, by reason of Constitutional debt limit in Washington, is in excellent condition, comparable to any. Property taxes for current operations are limited to 40 mills on an assessed value of 50% of actual value, the 1942 average aggregate property tax being only \$1.82 per \$100 of full value. The State occupation tax upon manufacturers is $\frac{1}{4}$ of 1% of gross sales, and no tax on *net* income is permitted by the Constitution. The major sources of state revenue are the retail sales tax and other excise taxes.

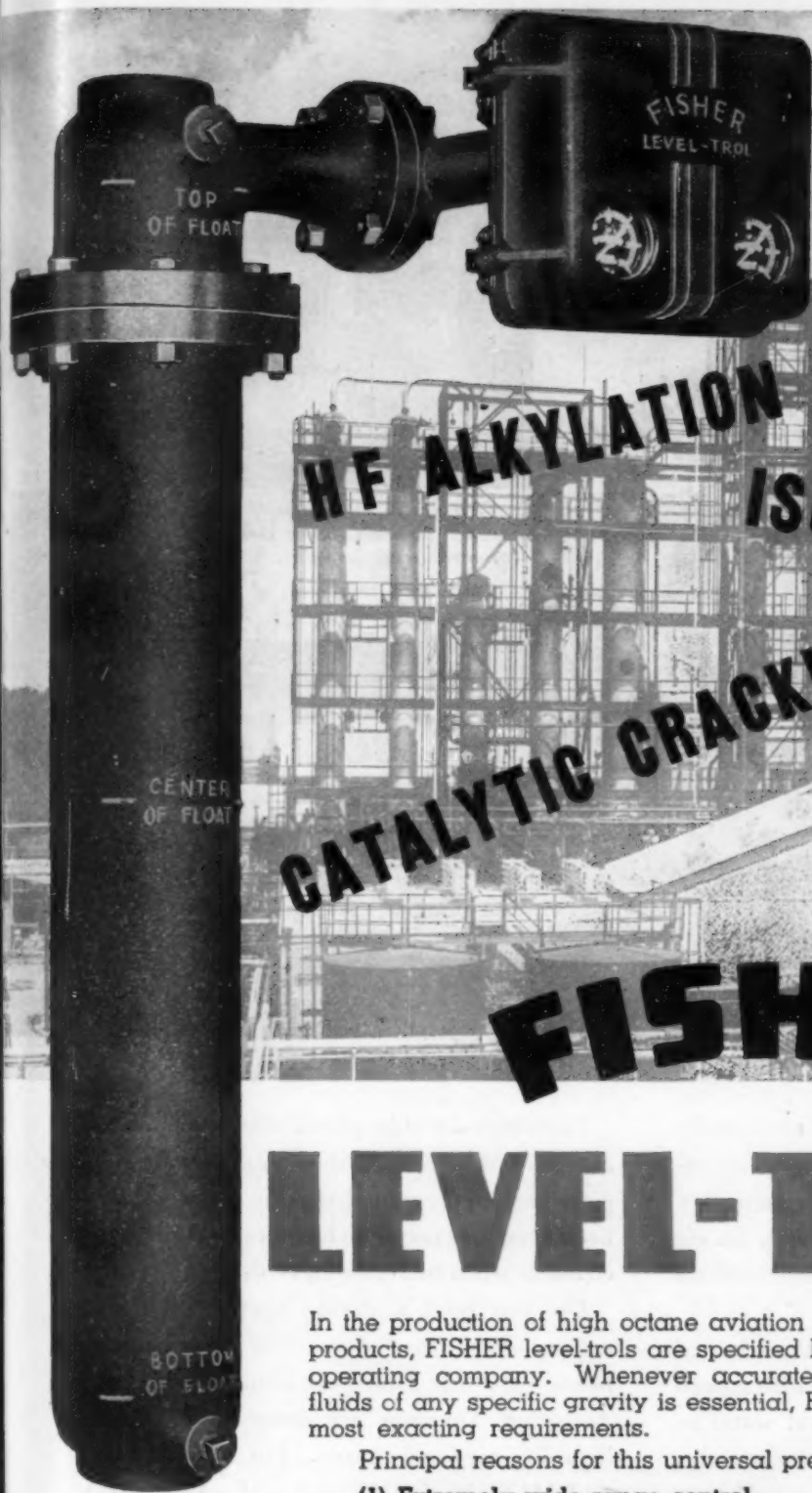


Engineering and technological investigations are invited.

Address:

WASHINGTON STATE PROGRESS COMMISSION

State Capitol Building, Olympia, Washington



STYRENE

H₂F ALKYLATION

ISOMERIZATION

CATALYTIC CRACKING

TOLUENE

FISHER

LEVEL-TROLS

In the production of high octane aviation gasoline and other vital wartime products, FISHER level-trols are specified by every leading contracting and operating company. Whenever accurate level control and indication of fluids of any specific gravity is essential, FISHER level-trols are meeting the most exacting requirements.

Principal reasons for this universal preference of FISHER level-trols are:

- (1) Extremely wide range control.
- (2) Maximum sensitivity assured by 100% pneumatic pilot.
- (3) Torque-tube construction — no stuffing box — insures trouble free operation.
- (4) Finger tip throttling range and level position adjustments.
- (5) A complete range of types and sizes for every operating requirement. Write for Bulletin F-1.

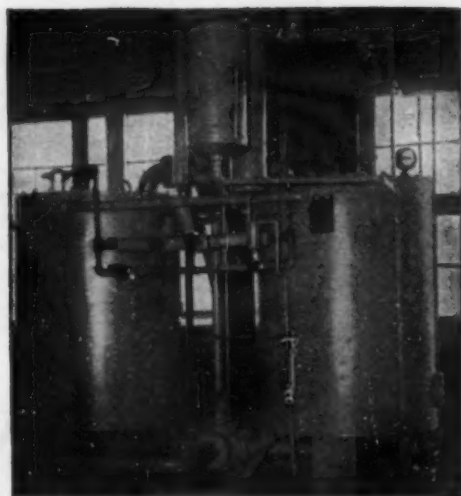
Type 2400-240A.
available in float
lengths up to 120
inches.



FISHER

GOVERNOR COMPANY
• 1817 FISHER BUILDING •
MARSHALLTOWN, IOWA

Because
exact control is imperative,
they keep air lines DRY with
Activated Alumina



Lectrodryers, charged with Alorco Activated Alumina, make certain that air controls work smoothly.

The control room, heart of giant copolymer plant operated by U. S. Rubber Co.



Synthetic rubber production calls for extremely accurate control of conditions under which reactions take place; the process is very sensitive to temperature and pressure variations. An air system provides the required close modulations of control.

Policing these air lines, keeping them free of moisture, are Lectrodryers charged with Alorco Activated Alumina. No chance that water in the lines will team up with dust to form sludge that will clog tiny valve ports. No rusting or freezing to interfere with the smooth operation of sensitive instruments.

Elsewhere in this plant, similar machines charged with Activated Alumina are drying inert gases used in the rubber-making processes. Difficult reactions are more likely to follow narrow channels when materials have definite dryness.


Do you need a drying agent which will remove every trace of moisture to dew points below -110°F ? That's the kind of job Alorco Activated Aluminas are doing with organic liquids air and gases. For help, write ALUMINUM COMPANY OF AMERICA (Sales Agent for ALUMINUM ORE COMPANY) 1910 Gulf Building, Pittsburgh, Pennsylvania.

"ALORCO"



PRODUCTS

ACTIVATED ALUMINAS



Can your product use the Pressurized Power in this Plane?

★ Have you ever watched a bomber fold its giant landing wheels into its wings?

The pressurized power that does this job is what we want to sell you. It is a hydraulic power system of entirely new efficiency and dependability . . . engineered for aircraft, available for all industry.

As a result of PESCO's more than ten years' specialization in making aviation pumps and related accessories, you will be able to equip your plant or product with a radically improved pumping system. For instance, you can have a compact, precision pump that delivers pressures up to 3000 pounds per square inch. This pump, weighing less than 4 pounds, forms the heart of a PESCO pressurized power

system with endless uses in industry for transmitting or controlling power.

In addition to hydraulic pumps, PESCO builds pneumatic, vacuum and fuel pumps of equally high efficiencies, meeting practically all needs for pressurized power or controlled liquid flow.

The performance of PESCO equipment in your plant or product . . . its greater efficiency, dependability, and longer years of service . . . is assured by the fact that it has been engineered to operate under flying conditions which are far more extreme and demanding than any encountered down on earth. Won't you let us tell you more about PESCO Pumps and PESCO Engineering Service?

SEND FOR THIS BOOK "Pressurized Power and Controlled Flow by PESCO". This book pictorially tells the story of PESCO equipment, manufacturing facilities and engineering service. A copy will be mailed promptly upon request.



WRITE TO...

PESCO Products Co.
Industry Service B
11610 Euclid Avenue
Cleveland 6, Ohio

Division Borg-Warner



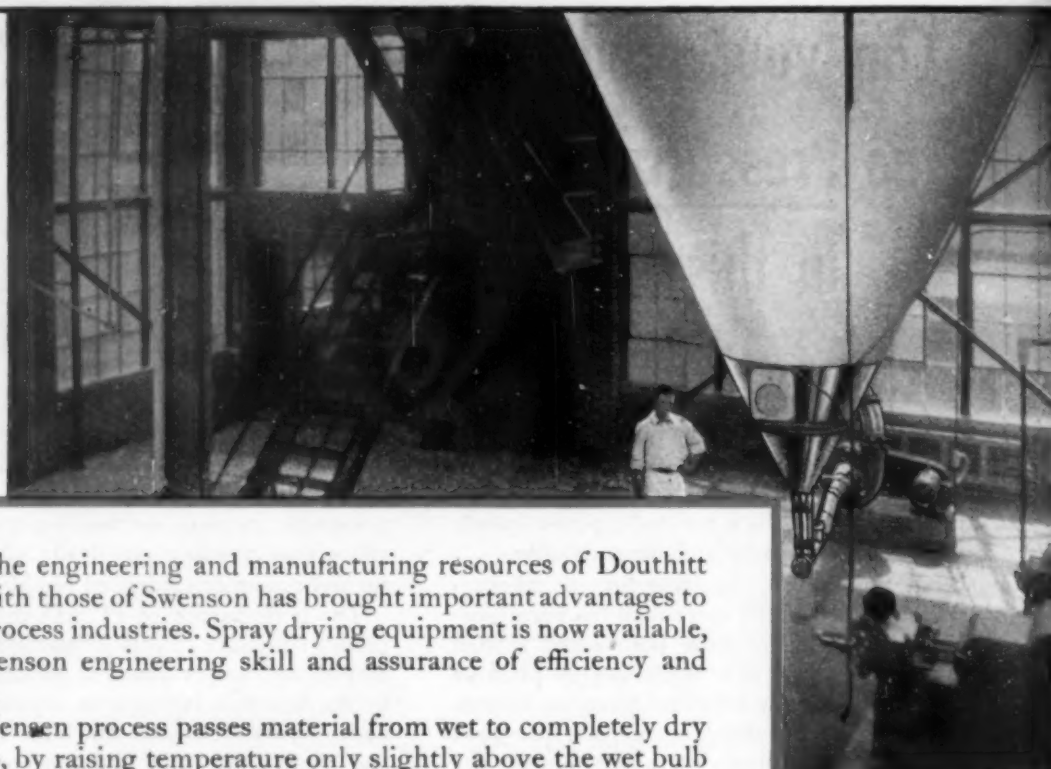
In Precision Hydraulics, Fuel Pumps,
Air Pumps, Related Accessories . . .

PERFORMANCE POINTS TO **Pesco** FIRST



NOW... SPRAY DRYING EQUIPMENT

Backed by **SWENSON** Engineering and
SWENSON Performance Guarantees



Merger of the engineering and manufacturing resources of Douthitt Gray-Jensen with those of Swenson has brought important advantages to the chemical process industries. Spray drying equipment is now available, backed by Swenson engineering skill and assurance of efficiency and dependability.

The Gray-Jensen process passes material from wet to completely dry in a single step, by raising temperature only slightly above the wet bulb reading. This high efficiency has made Gray-Jensen the preferred equipment for spray drying foodstuffs; and the same advantages recommend it for numerous drying operations in the chemical industries—particularly for materials subject to decomposition under excessive heat.

Material spray dried by the Gray-Jensen process consists of minute particles in spherical form that require no crushing or sifting. It is characterized by ready solubility.

Douthitt Gray-Jensen engineers will welcome an opportunity to discuss the adaptation of spray drying equipment to your particular needs.



DOUTHITT GRAY-JENSEN

SWENSON EVAPORATOR CO. DIVISION of WHITING CORPORATION

• 221 No. La Salle St., Chicago 1, Ill., U. S. A. •



HEAT-SEASONED MOTOR CASTINGS to forever insure accuracy of fit and stability of power

IN ELECTRIC motors one of the principle causes of bearing destruction, electrical losses and vibration is the common failure to *normalize* castings before machining. It has been definitely proved that "green" or "unseasoned" castings will change shape by many thousandths of an inch over a period of time. As little as one thousandth inch in distortion will set up destructive action. This change is attributed to the presence of strains within the metal, due to the rapid and uneven solidification of the metal when cast.

Formerly the only way known to elimi-

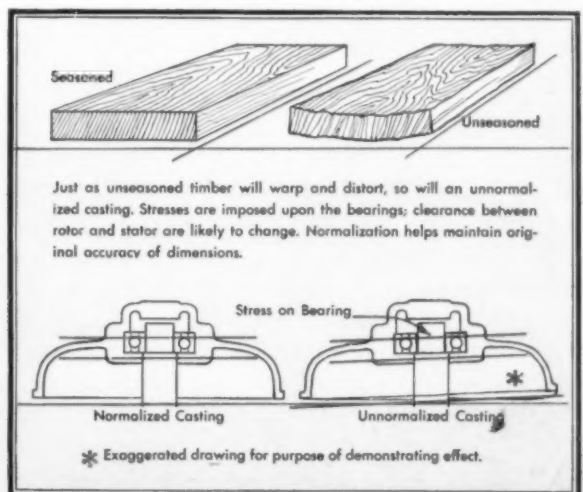
nate these strains was to allow the castings to "weather-season" for several months or years before machining. But now, *U. S. Motors* have introduced a positive process of heat-seasoning motor castings, on a large production basis.

Approaching most closely to the point of indestructibility, *U. S. Motors* attain a new standard of accuracy in the use of normalized castings. All *U. S. Motor* castings are now heat-seasoned before any machine work is performed. This process relieves strains, refines the

structure of its metal and tends to eliminate hard spots which would otherwise cause uneven resistance to cutting tools, produce inaccurate work and reduce production efficiency.

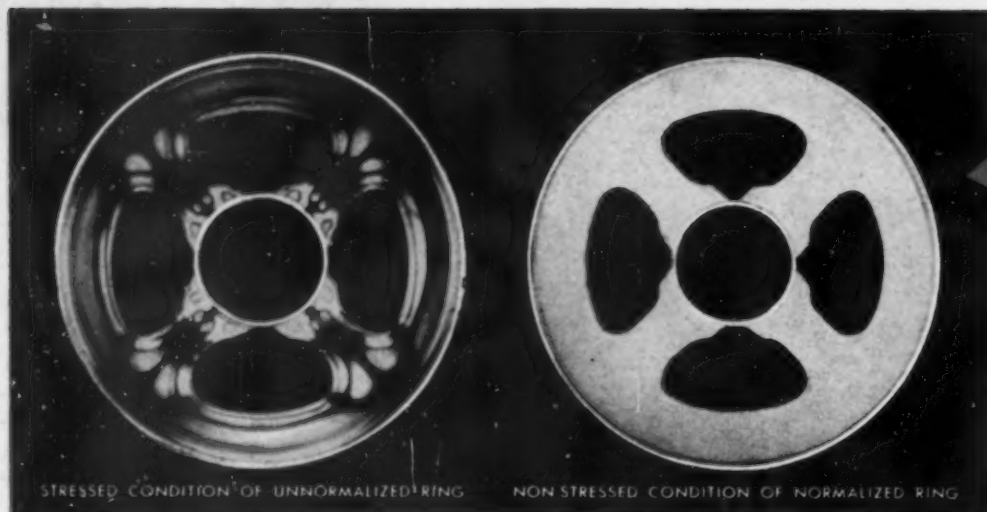
U. S. Motor quality is enhanced, motor performance is improved and the life of the motor is substantially prolonged by the *U. S.* process of normalization.

Importance of the normalizing procedure is recognized by many industries; for example, production of automotive engines, large telescopes and precision testing machinery. Yet to the best of our knowledge no other electric motor manufacturer has developed similar means of processing castings to insure long life.



U. S. MOTORS

STABILIZED WITH NORMALIZED CASTINGS



STRESSED CONDITION OF UNNORMALIZED RING

NON STRESSED CONDITION OF NORMALIZED RING

POLARIZED LIGHT

POLARIZED LIGHT PASSED THROUGH CERTAIN TRANSPARENT MATERIALS REVEALS THE EXISTENCE AND DISTRIBUTION OF STRESS. A MODEL OF A RING WITH FOUR ARMS RADIATING FROM A CENTRAL HUB IS SHOWN AT EXTREME LEFT. IN A STRESSED CONDITION CORRESPONDING TO A CASTING BEFORE NORMALIZING. EACH COLOR FRINGE REPRESENTS A STATE OF STRESS WITHIN THE MODEL. THE UNSTRESSED MODEL CORRESPONDING TO A NORMALIZED CASTING IS SHOWN AT THE RIGHT. REMOVAL OF COLOR FRINGES INDICATE COMPLETE STRESS RELIEF.

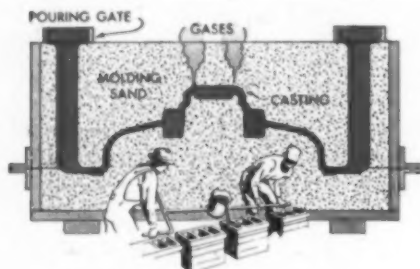
WHY NORMALIZED CASTINGS ARE SO VITALLY NECESSARY

WHEN molten metal flows into the cold mold of a casting, chilling to the state of solidification is never uniform. The grain structure varies. Strains generate. Where the molten iron must flow through restricted passages to reach larger chambers of the mold the temperature is reduced before the metal reaches its destination. The only known way to commercially correct the molecular structure is by normalizing the castings. Normalization involves controlled cooling. It consists of reheating the casting to a temperature above the critical range, holding at that tempera-

the elimination of internal stresses. Hence we speak of U. S. Motor castings as having the closest approach to an equilibrium grain structure. To accomplish this we expose the castings to a heat seasoning at the critical temperature for granular readjustment. U. S. die-cast rotors and electrical sheet steel used in the laminations are also heat-treated, to add stability to their structure.



DRAWING DEPICTS VARIANCE OF GRAIN SIZE IN DIFFERENT AREAS OF A CASTING.



CROSS SECTION OF A MOLD BOX, SHOWING THIN AND THICK CASTING AREAS WHICH COOL UNEVENLY.

ture for a certain length of time, and then cooling very slowly and uniformly. The objective toward which U. S. Motor engineers point is the production and processing of castings with an equilibrium grain structure; not too fine, not too coarse, but a "happy medium" as well as

NO WARP - NO STRESS - NO MISALIGNMENT

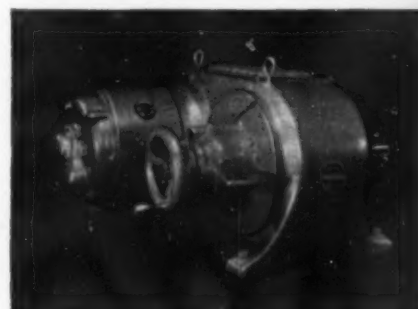
All of this sums up to increased motor life. The bearings in U. S. Motors give longer life because there is no distortion set up by improperly seasoned castings. Bearings and rotors are kept permanently aligned. The air gap clearance between rotor and stator is constantly accurate.

U. S. pioneered the improved appearance of motors by streamlining the design. U. S. developed Asbestos-protection to guard against carbonization of windings. Lubriflush lubrication is a late development in U. S. Motors. So now, in offering normalized castings, U. S. Motors advance still further in the progress of quality without increasing cost to the purchaser.

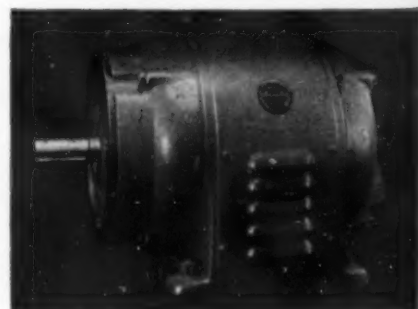
Ask for Bulletin, "Normalized Castings"



U. S. Syncogear Motor, Type GR



U. S. Varidrive Motor



U. S. Unimount Motor

The QUALITY LINE of Power

- VARIDRIVE MOTORS for infinite speeds
- SYNCOGEAR MOTORS for multiplied power
- UNICLOSED MOTORS Horizontal and Vertical
- UNIMOUNT MOTORS Horizontal and Vertical
- TOTALLY-ENCLOSED MOTORS for hazardous services
- AERO-TEST STANDS for aircraft servicing

AUTOSTART Grinders and Buffers

U.S. ELECTRICAL MOTORS Inc.

ATLANTIC PLANT: MILFORD, CONN. • PACIFIC PLANT: LOS ANGELES, CALIF.
Assembly Plant: Chicago. Branches: New York, Boston, Pittsburgh,
Philadelphia, San Francisco, Seattle. Agents in all principal cities.



U.S. MOTORS

—embody

ASBESTOS PROTECTION
NORMALIZED CASTINGS
LUBRIFLUSH LUBRICATION

STREAMLINE DESIGN • WEATHERPROOF HOUSING
SOLID DIE CAST ROTORS • INTRACOOLED VENTILATION
AUTOSTART ACTION



GAZE ON A MIRACLE IN *Gear Production*

BOMBERS carrying bigger loads than freight cars! Fighters that can dive faster than sound travels! These are modern miracles of air warfare—miracles made possible by the giant Wasp Engines that power these planes.

And miracles beget miracles. For in these engines are gears of such extreme precision that their manufacture by any other method save exhausting hand labor, was long deemed impossible. Transforming these hand methods into mass production—turning out these high-precision gears by the hundreds of thousands needed for the world's largest

air armada—was an achievement made possible by new manufacturing methods—new production techniques developed by Foote Bros.

These precision gears may well open the way to new miracles in the economical transmission of power when the war is won. For already on the boards of many American manufacturers are plans for machines that will utilize the type of precision gear Foote Bros. are producing for aircraft engines.

FOOTE BROS. GEAR AND MACHINE CORPORATION
5225 South Western Boulevard • Chicago, Ill.



FOOTE BROS.

Better Power Transmission Through Better Gears

Two New Phosphorus Compounds in Search of a Problem



DIPHENYL PHENYLPHOSPHONATE $C_6H_5PO(OC_6H_5)_2$

Physical properties—White crystals soluble in alcohol, ether, benzene; insoluble in water. Molecular weight, 310. Melting point, 63.5°C.

Chemical properties—Stable to hydrolysis by aqueous caustic. Hydrolyzed by alcoholic caustic.

Suggested uses—Plasticizer, lubricating oil additive, additive for cellulose plastics as a fire retardant.



DIPHENYL PHENYLPHOSPHINATE $C_6H_5P(OC_6H_5)_2$

Physical properties—Colorless to straw-colored liquid soluble in alcohol and common organic solvents; insoluble in water. Molecular weight, 294. Specific gravity, 1.166 at 26°C. Boiling point, 208°C. (5 mm.).

Chemical properties—Hydrolyzes very slowly in water. Contains trivalent phosphorus.

Suggested uses—Lubricating oil additive, soap preservative, anti-oxidant, plasticizer.

Perhaps you have the problem? . . . a problem for which one of these two new phosphorus compounds can provide the desired solution? Research work conducted in the Victor laboratories indicates potential applications such as lubricating oil additive, soap preservative, anti-oxidant, plasticizer, and others. ★ Because of present limitations in the supply of certain critical materials, samples of these and other Victor Research Chemicals announced from time to time are available only in small quantities for experimental investigation. Such samples will be sent promptly upon request. Some of Victor's Phosphorus Compounds . . . for which research has established important uses in essential war production . . . are already available in commercial quantities.

Victor

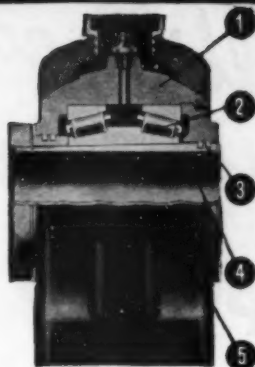
CHEMICAL WORKS

HEADQUARTERS FOR PHOSPHATES • FORMATES • OXALATES

141 WEST JACKSON BOULEVARD, CHICAGO, ILL., NEW YORK, N. Y., KANSAS CITY, MO., NASHVILLE, TENN., GREENSBORO, N. C. PLANTS: NASHVILLE, TENN., MT. PLEASANT, TENN., CHICAGO HEIGHTS, ILL.



"FOUR FREEDOMS" THAT RELEASE more power for VICTORY



WHY DODGE-TIMKEN SPECIAL DUTY ADAPTER TYPE BEARINGS GET MORE POWER TO WORK:

- ① Full ball and socket self alignment protects against wear and power-loss . . . also simplifies installation.
- ② Dodge-Timken roller bearings provide full bearing capacity for radial and thrust loads . . . putting all the power in the job.
- ③ All metal automotive type piston ring seals keep grease in and dirt out, closing the bearing tightly against entry of foreign substance, but leaving it wide open to passage of power.
- ④ Long, split adapter sleeve distributes load over entire length of bearing . . . reduces pressure per square inch on shaft and eliminates peening action which causes rapid wear.
- ⑤ Rugged, well proportioned outer housing gives over-all protection to bearing.

These bearings are delivered completely assembled, ready for instant installation, capable of 30,000 hours' service under conditions for which they are designed; original lubrication lasts throughout 50 million revolutions. Available in a wide selection of types and sizes, suitable for all service conditions.

Typical installation of Dodge-Timken Special Duty Bearings and Dodge D-V Drive.

Freedom from friction . . . freedom from power-loss . . . freedom from wear . . . freedom from maintenance! . . . Dodge-Timken Bearings combine ruggedness, precision construction and smooth operating efficiency to bring those "four freedoms" to industry!

These rugged bearings keep power transmission channels free for full, unhampered flow of power to production machines. They prevent "clogging" of power-flow . . . they protect against slow-ups or "power blackouts" that are the ever-menacing maintenance threat of obsolete, worn out, friction-ridden bearings.

Now, and in post-war production, your plant can get more power to work with Dodge-Timken Bearings and other Dodge Power Transmission equipment.

Contact your local Dodge Distributor or write to

DODGE MANUFACTURING CORPORATION
Mishawaka, Indiana, U. S. A.



Dodge-Timken Special Duty Ball and Socket Pillow Block

Dodge-Timken Special Duty "B-1" Pillow Block

Dodge-Timken Special Duty "D" Unit Mount

Dodge-Timken Special Duty "B-1" Unit Mount

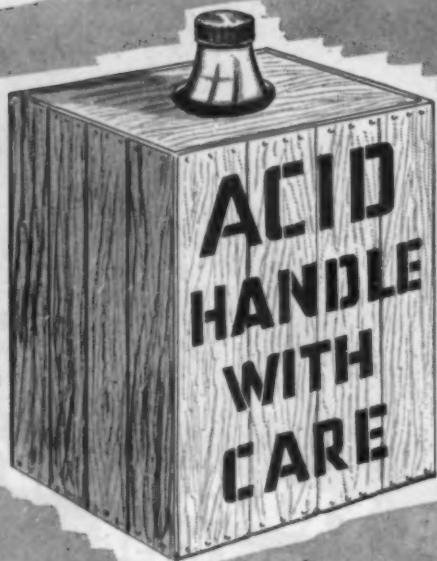
Dodge-Timken Special Duty "B-1" Unit Mount

DODGE

MISHAWAKA

THROW ALL YOUR SCRAP INTO THE FIGHT! BUY MORE WAR BONDS!
THE RIGHT DRIVE FOR EVERY JOB

PUT ALL YOUR POWER IN THE JOB



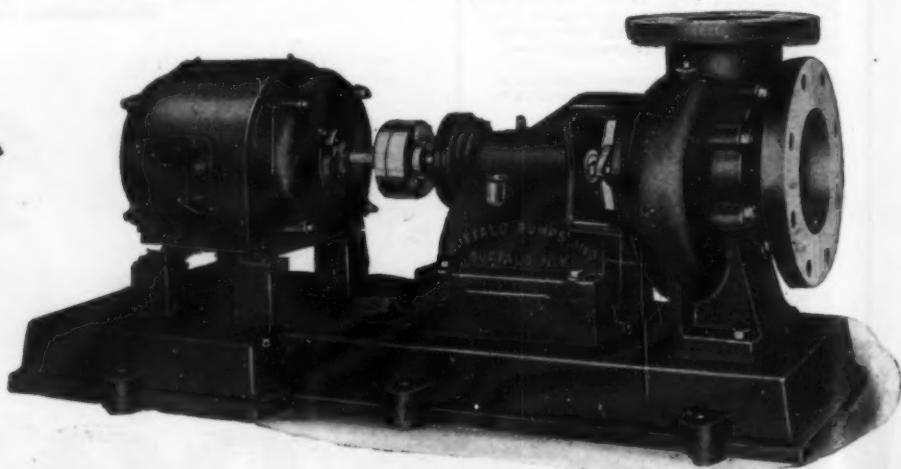
*..and special handling care
begins on the drafting table
with "Buffalo" PUMPS*

Buffalo Chemical Service Pumps are not just adaptations of ordinary pumps to chemical operations. Here's a line of pumps that have "grown-up" with the chemical industry—every one is fortified by skilled engineering from the drafting table straight through special construction to handle the liquid in question.

That's why Buffalo Chemical Pumps stand up, year in, year out, under the most destructive acid attack. Yes, and turn in exceptional records for lower operating costs, minimum repairs and time-outs.

Want engineering data on chemical pumps built with nearly a half-century of pump know how? Write for Bulletin No. 982.

"Buffalo"
**CHEMICAL SERVICE
PUMPS**



BUFFALO PUMPS INC.

501 Broadway

Buffalo, N. Y.

Canada Pumps Ltd., Kitchener, Ont.



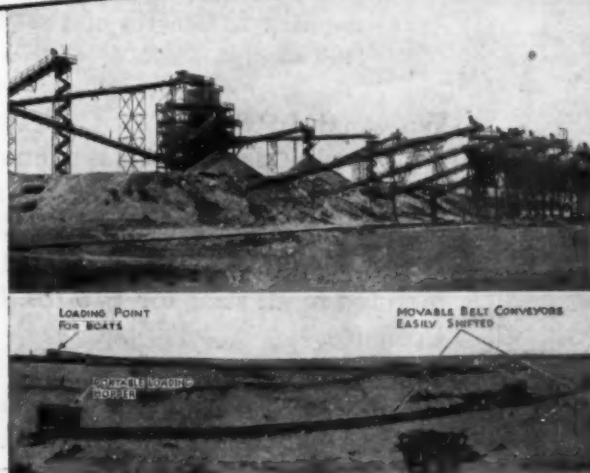
AS TIME GOES BY...

Designs Change . . . but S-A Quality Remains the Same

• Changing times bring changing needs. The need for new and better labor-saving, conveying methods is always present. We at Stephens-Adamson have always held it primarily important not only to stay abreast of new developments . . . but to anticipate and constantly plan for them.

Right now, this aspect of S-A activity has *double* significance . . . (1) the solution of your present problems . . . (2) the solution of new handling problems connected with new processes and products contemplated for the post-victory world.

STEPHENS-ADAMSON MFG. CO., 3 Ridgeway Ave., Aurora, Ill.



STEPHENS-ADAMSON

MFG. CO.

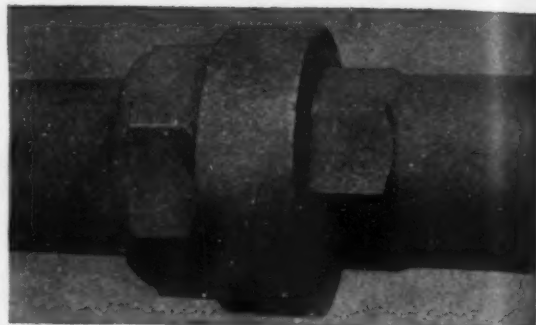
Designers and Manufacturers of All Types of
BULK MATERIAL HANDLING EQUIPMENT

Walworth Hi-Test Cast Iron Threaded Pipe

gives these three special advantages

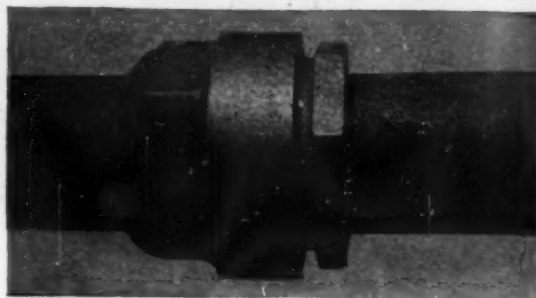
1 CORROSION RESISTANCE where it's needed most

Extra wall thickness at the threads in Walworth Hi-Test Oversize Threaded joint provides greater strength and resistance to corrosion.



2 TIGHT EXPANSION JOINTS

Hi-Test flexible expansion joints, available with Walworth Hi-Test Cast Iron Pipe, provide a tight connection and allow for 1½" expansion or contraction. There are no exposed threads or bolts.



3 FLEXIBILITY IN THE LINE

Notice the unusual flexibility achieved with a Hi-Test expansion joint and two standard 20' lengths of 1¼" Walworth Hi-Test pipe.



Walworth L.P.S. Hi-Test Cast Iron Threaded Pipe with regular pipe size threads is primarily for use in drainage, vent and waste lines in buildings and for pipe lines above or below ground. It complies with Federal Specification No. WW-P-356, dated August 19, 1936, and is recommended in all sizes for 175 lbs. Non-Shock Cold Water Pressure.

Walworth I.P.S. and W.P.S. Hi-Test Pipe with over-size threads are principally for use in underground water and gas distribution systems. For complete details write for Bulletin 57.



You'll find pertinent information on Walworth's complete line of valves, fittings, pipe, and pipe wrenches in the new Walworth Catalog 42. Included are 78 pages of practical engineering data that simplify valve selection and make piping layouts easier. Write, on business stationery, for your free copy. Address: Walworth Company, 60 E. 42nd St., New York 17, N. Y. Dept. D6.

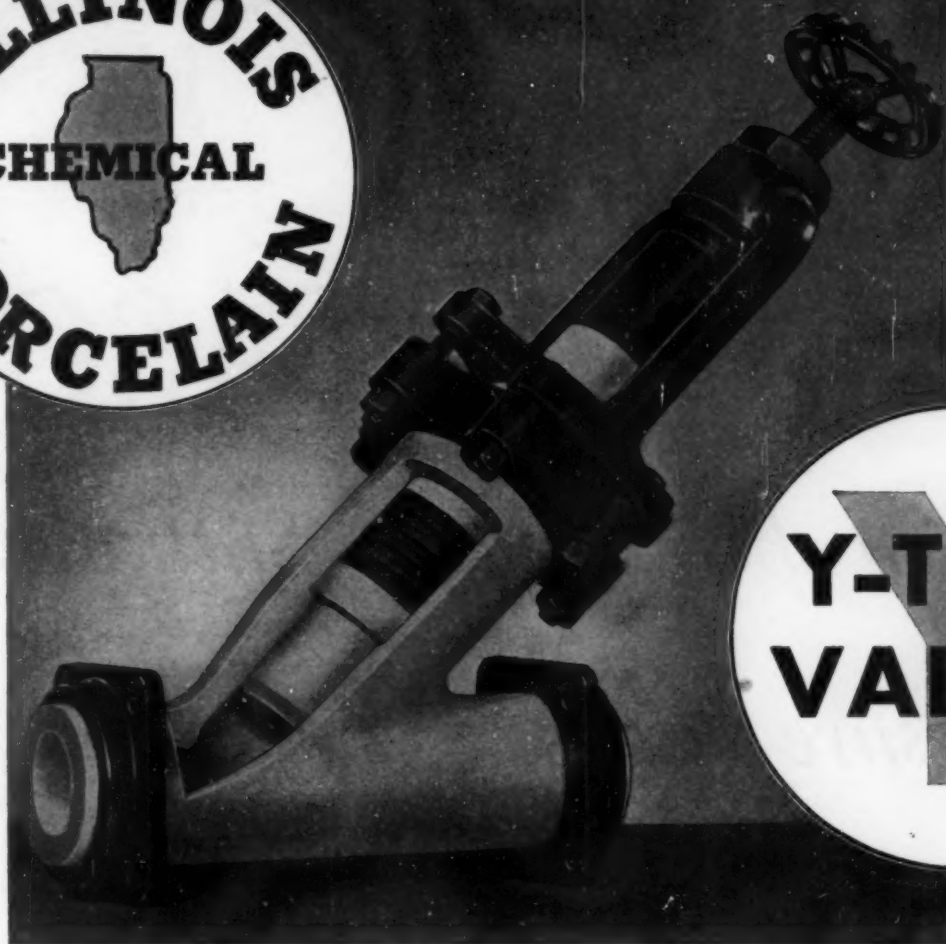


WALWORTH

valves and fittings



DISTRIBUTORS IN PRINCIPAL CENTERS THROUGHOUT THE WORLD



PORCELAIN ADDS LONGER LIFE TO INSTALLATIONS

The valve seat is located in lowest possible position so that you get uninterrupted flow of material when stem is in open position. Packing is acid-resisting asbestos—graphite impregnated. Ends of valve are ground parallel for gasketing. All valves are tested 100 lbs. hydraulic pressure.

ILLINOIS Porcelain Y-Type Valves are easy to operate. They can be used for most acid- and chemical-handling requirements.

• *Send for our latest catalog.*

**NON-CORROSIVE
NON-ABSORBENT**

**PORCELAIN
SAVES CRITICAL MATERIALS**

**NO ELECTROLYTIC ACTION
IS POSSIBLE**

**ALL VALVE SEATS ARE
PORCELAIN TO PORCELAIN**

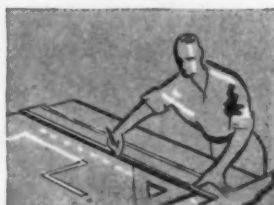
ILLINOIS ELECTRIC PORCELAIN COMPANY
MACOMB, ILLINOIS

8

REASONS

why you should specify Standard Steel

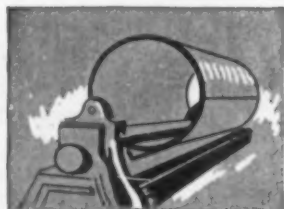
pressure vessels



1 Large staff of highly trained engineers and designers.



2 All incoming materials carefully inspected.



3 Complete facilities for all forming and fabricating operations.



4 Highly trained, qualified welding operators.



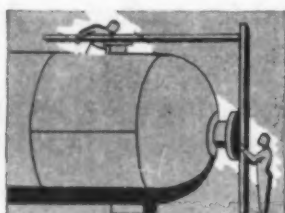
5 X-Ray inspection insures soundness of welding.



6 Experienced shop personnel, competent field crews, excellent shipping facilities.



7 Qualified to ASME, API, ASME, Navy and American Bureau of Shipping Codes.



8 Complete over all inspection given to out-going shipment.



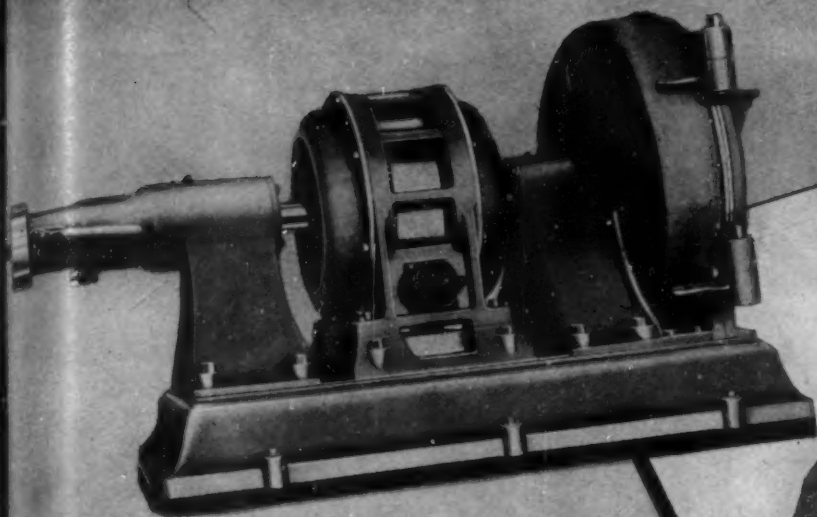
Standard Steel pressure vessels whether of the plain carbon steel grades, low alloy carbon steels, or solid stainless and clad materials are carefully engineered, accurately made and rigidly inspected. And what is true of these vessels also holds for the full line of refinery and chemical equipment built by this company. Towers, condensers, exchangers, tanks, receivers, reboilers, autoclaves, are all subjected to rigid control and inspection during manufacture. Following completion, further thorough checks and tests are made under operating conditions beyond normal requirements.

Our engineers and designers are at your service. Quotations will be furnished promptly.

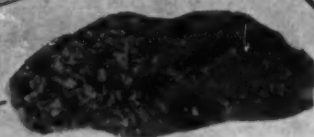
STANDARD
STEEL CORPORATION

General Offices and Plant: 5001 South Boyle Avenue
Los Angeles 11, California

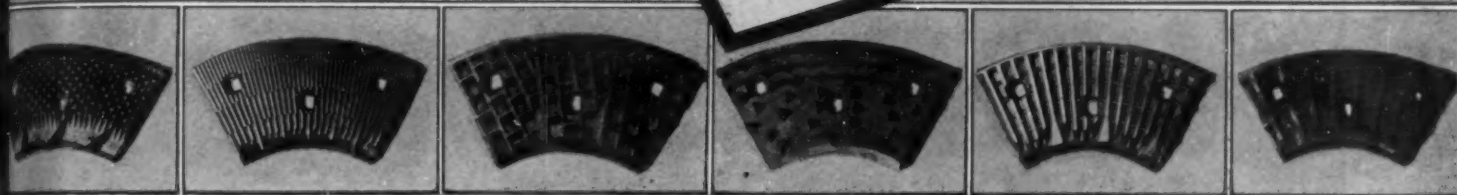
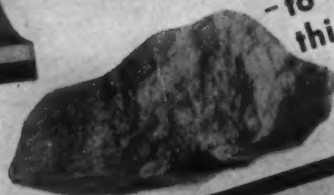
SOUND ENGINEERING — PROVED PERFORMANCE



from
this—



—to
this



Six of the sixty or more reasons for the versatility of SPROUT, WALDRON ATTRITION MILLS. These plates show the variety of face patterns which, together with such features as adjustment of clearances while machine is running,

oversize bearings, quick accessibility of working parts, low power requirements and high capacity per square foot of floor space, explain their records for production.

Interchangeable Grinding Discs and Speed Changes Let You Control Size Reductions with the Same SPROUT, WALDRON ATTRITION MILL

The SPROUT, WALDRON ATTRITION MILL is so versatile it belongs in nearly every plant with a variety of grinding operations.

With a properly selected set of grinding plates—easily changed and easily cleaned—you can grind widely diversified materials—dry, moist or wet—to uniform and controllable size ranging from 100 mesh or finer to the size of a pea.

The grinding plates are made in six segments from hard white cast iron, ground as a complete set to uniform and parallel thick-

ness, with facing periferies trued, then weight-matched and balanced.

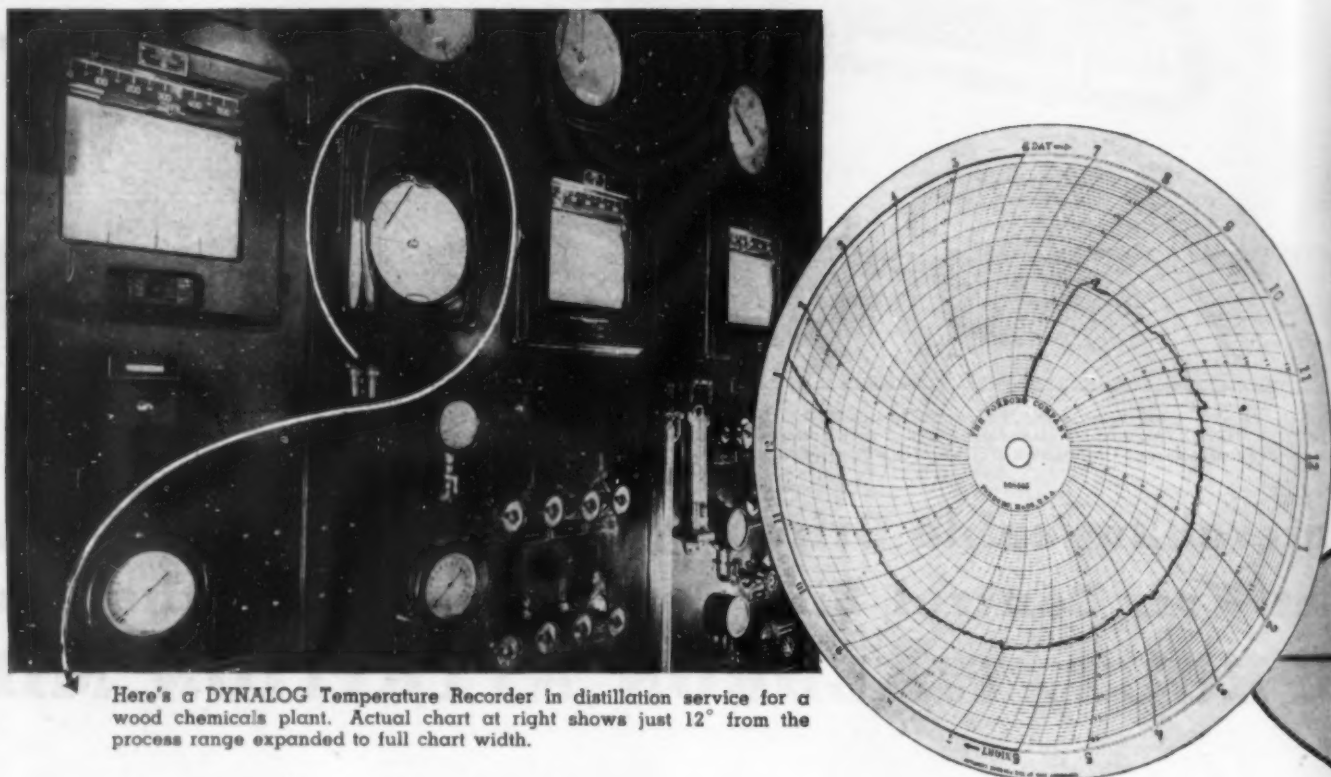
Result: Unusually long life, uniform size reduction of particles, a quality operation throughout.

Tell us what you have to grind and from the more than 5,000 test-run records and samples in the Experimental and Proving Department, we'll send data and information on these Attrition Mills, some of which have been continuously operated for 40 years.

SPROUT, WALDRON & COMPANY
Manufacturing Engineers since 1866
150 SHERMAN STREET MUNCY, PENNSYLVANIA

• Mixers, Grinders, Sifters, Feeders, Conveyors, Packers and Special Equipment for Process Industries.

On the Record



Here's a DYNALOG Temperature Recorder in distillation service for a wood chemicals plant. Actual chart at right shows just 12" from the process range expanded to full chart width.

Foxboro engineers blaze the way to electronic sensitivity in instruments!

Today, a leading wood chemicals plant is obtaining batch distillation temperature records that can be read to $1/10^{\circ}\text{C}.$! This high sensitivity and accuracy means extra production - increased output of the desired cut. It is a production and economic achievement brought about by Foxboro's Electronic Dynalog Instruments.

Yet, this is only one example of the "milestones" Foxboro has established in electronic instrumentation.

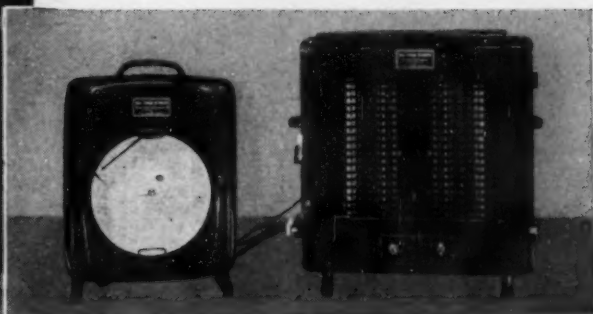
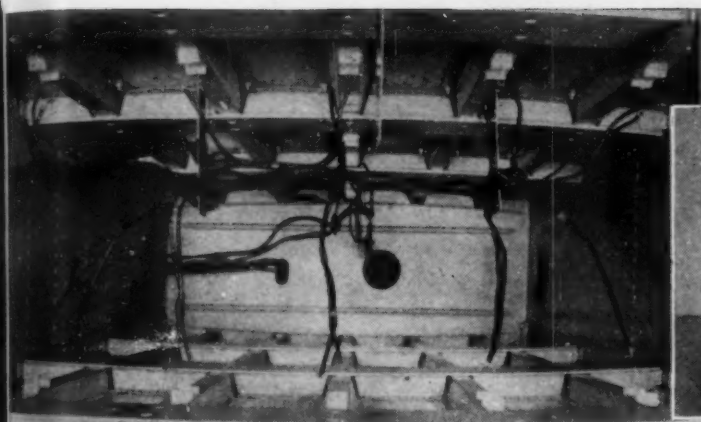
Pre-War and Wartime Developments

For more than eight years, Foxboro Verigraph Electronic Instruments have been widely used in rubber and paper industries. In meteorological service, a Foxboro Electronic Temperature Recorder has performed outstandingly for three years. And other electronic instruments by Foxboro are now enabling unique speed and accuracy in stress analysis of war planes.

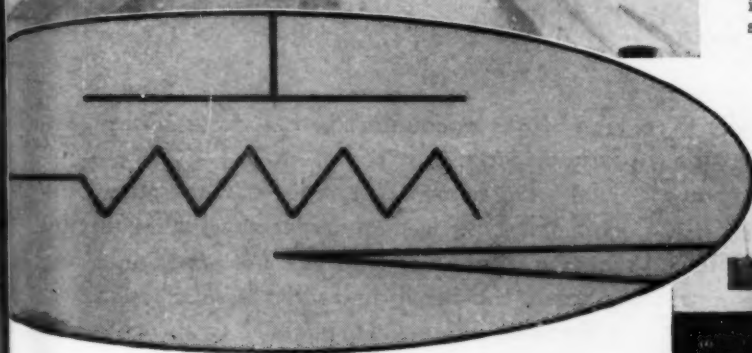
DYNALOG

Electronic Measurement and Control

...New Degrees of Sensitivity in measuring process variables!

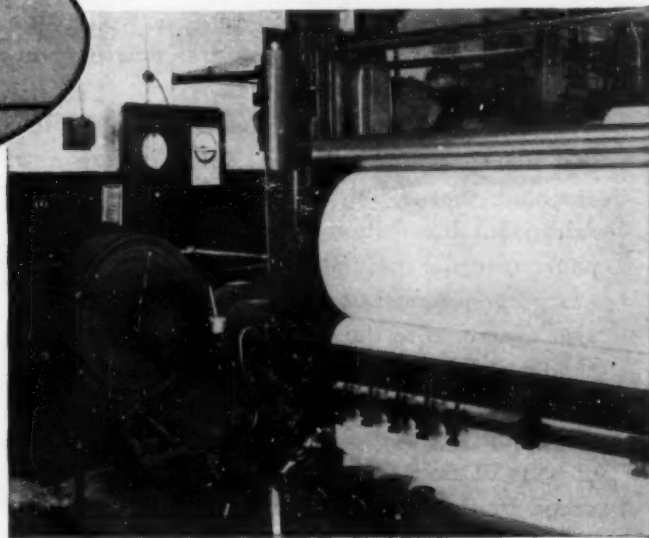


Interior view of warplane wing (left) shows installation of SR-4 strain gages. The automatic-switching Electronic Recorder (above) enables exact, speedy reading of 48 test-points under any loading!



Important Future Implications

Today's production of these instruments is focused on war applications. Tomorrow, the same advanced sensitivity will be available to all industry in Foxboro DYNALOG Instruments. Difficult measurement and control problems will be vastly simplified. In some industrial operations, DYNALOG Instruments will provide the first practical instrumentation ever developed! The Foxboro Company, 16 Neponset Avenue, Foxboro, Massachusetts, U. S. A. Branches in principal cities.



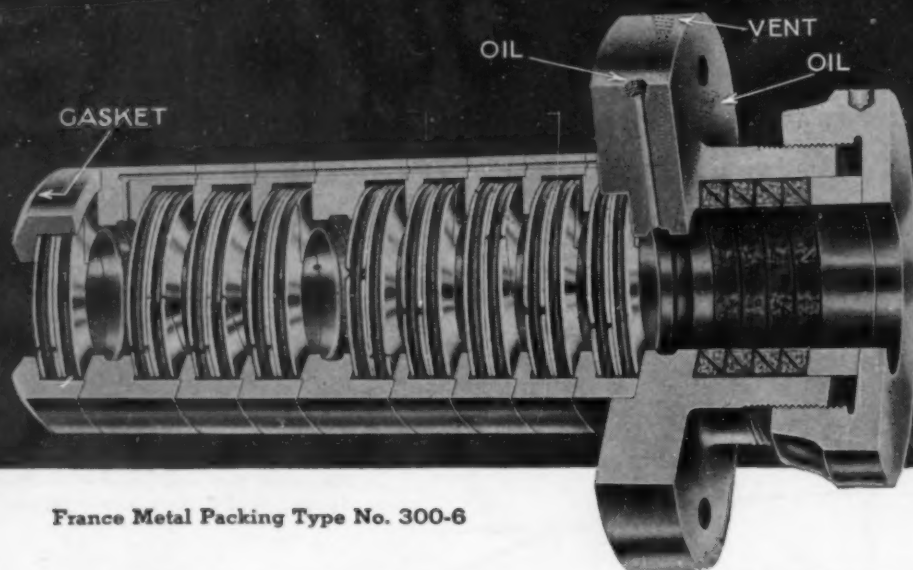
Typical installation of Verigraph Recorder in paper mill. These electronic instruments continuously measure moisture of moving sheets. Sensitive to changes as small as 1/10 of 1%!

by **FOXBORO**
REG. U. S. PAT. OFF.



INSTALL FRANCE METAL PACKING

For Uninterrupted Air and Gas Compressor Service



France Metal Packing Type No. 300-6

This type of packing was designed especially to handle the many and varied gases as well as the higher pressures and temperatures now encountered in processing industries.

One of its outstanding advantages is the fact that it is provided with lubrication where most essential, that is, beyond the first pair of rings. Additional lubrication is provided between the packing in the main stuffing box and that in the auxiliary stuffing box. A provision for venting is also contained in the assembly.

Furnished either with or without the auxiliary stuffing box arrangement, depending on the type of gas and the operating conditions. The number of pairs of rings in the main stuffing box is governed by the pressure and operating conditions. The main stuffing box rings are made from the material which we have found from experience to be best suited for the

type of gas encountered—cast iron, bronze, mica or carbon.

Like the many other types of packing we design, this type is manufactured with the utmost care by mechanics with years of experience and it carries our usual guarantee of satisfaction.

If you are interested in packing that l-a-s-t-s, packing that remains t-i-g-h-t and requires minimum attention, then write for detailed information that will apply to your particular requirements.



Ask for illustrated Catalog No. M-4

The France Packing Company
Tacony, Philadelphia 35, Penna.



Specialists in the design and manufacture of

The Original France Metal Packing for all conditions of service

Economical Protection

of Product Purity and Equipment Investment

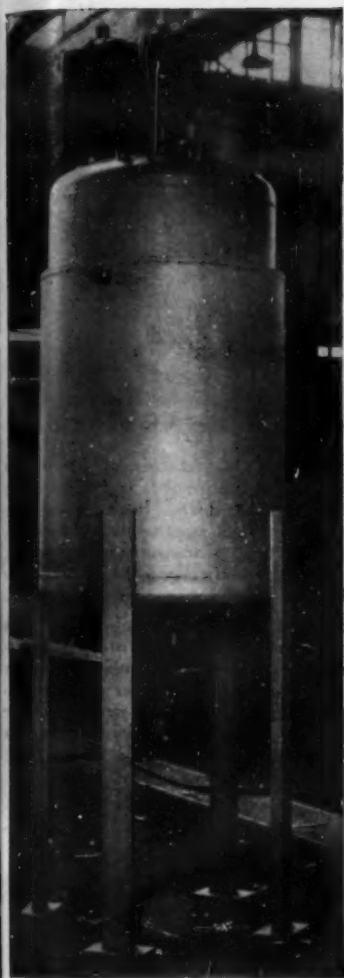
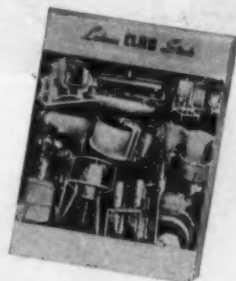
If your product is adversely affected by metallic contamination—

Or if corrosion of the processing and handling equipment causes abnormal maintenance expense and costly shutdowns for replacement—

Lukens Clad Steels may solve both problems permanently and economically.

The clad layer of nickel, Inconel or Monel, permanently bonded to a steel backing plate, possesses the same corrosion resistance and chemical stability as solid nickel, Inconel or Monel. Yet, since the clad layer represents but a fraction of the total weight of the clad steel plate, the use of Lukens Clad Steels effects important savings in these expensive and critical materials. As a result, equipment can be fabricated from Lukens Clad Steels at from $\frac{1}{2}$ to $\frac{2}{3}$ the cost of similar equipment made from solid nickel, Inconel or Monel.

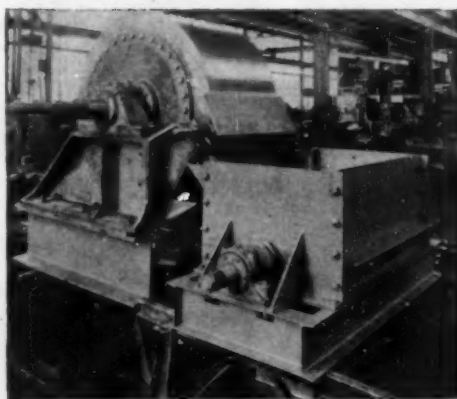
The illustrations on this page are typical of scores of installations in which Lukens Clad Steels are providing economical protection of product and equipment. This interesting 28-page booklet shows many others and contains other interesting data on applications of Lukens Clad Steels. Write for it.



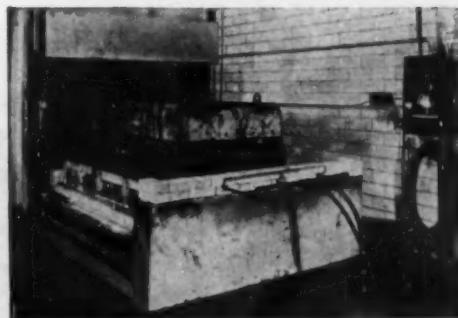
RESIN KETTLE—This 675 gallon resin kettle was fabricated by Hendrick Manufacturing Company, Carbondale, Pa., of 20% and 15% Lukens Nickel-Clad Steel. Nickel-Clad Steel was employed to prevent discoloration by metallic contamination of the light-colored resins processed in it.



CHEMICAL REACTION VESSEL—This vessel, 3' 0" diameter and 5' 0" high, for handling complex organic chemical reaction, was fabricated from Lukens Inconel-Clad Steel by Liberty Coppersmithing Co., Philadelphia, Pa.



CAUSTIC FLAKING EQUIPMENT—This equipment consists of a flaker pan made of $\frac{3}{8}$ " thick 10% Lukens Nickel-Clad Steel and a flake breaker hopper made of $\frac{1}{2}$ " and $\frac{1}{4}$ " thick 10% Lukens Nickel-Clad Steel. It was fabricated by The Colonial Iron Works Company, Cleveland, Ohio.



NITRIDING CONTAINER—This container for nitriding radial drill spindles and spindle sleeves, 3' 9 $\frac{1}{4}$ " wide, 5' 11" long and 1' 6" high, was constructed of 10% Lukens Nickel-Clad Steel by The Breese Brothers Company, Cincinnati, Ohio. The Nickel-Clad surface, on the inside of the container, is not affected by prolonged or repeated contact with ammonia gas at high temperatures which causes early deterioration of carbon steel containers.

LUKENS STEEL COMPANY • World's Largest Plate Mill • 214 LUKENS BUILDING • COATESVILLE, PA.

Lukens **CLAD** **Steels**

NICKEL-CLAD **INCONEL-CLAD** **MONEL-CLAD**

Another OUTSTANDING JOB by CONTINENTAL

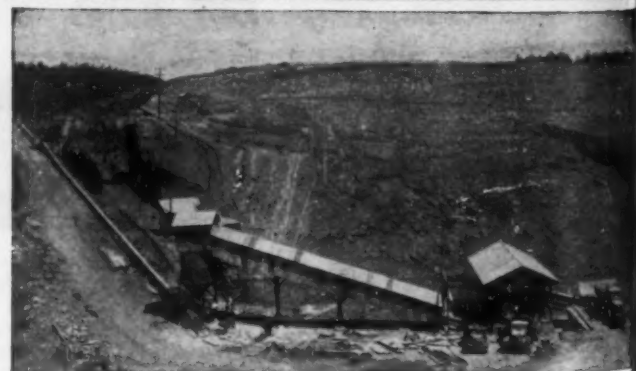


Our Belt Conveyor Engineering Data Book, ID-105 is just off the press. Contains complete information on Belt Conveyors. Write for a copy today.

National Cement Company, Ragland, Alabama, opening a new quarry, was confronted with the problem of handling crushed stone one and one-quarter miles from quarry to mill stock pile. After considering all methods of haulage, the management, in conjunction with Continental engineers, designed a Belt Conveyor System giving a cost per ton for handling considerably under any other system considered.

The complete Conveying System is made up of seven Main Conveyors, the overall centers of each based on the topography, but all using the same size motors and drives for interchangeability. Continental equipment is used throughout. The proven low cost (less than 1c per ton) for handling this material has fully justified the management's decision to move their crushed stone via Continental Belt Conveyors.

We are proud of Continental's part in designing this equipment to move stone at a minimum cost per ton, low maintenance and a minimum of labor.



INDUSTRIAL DIVISION
CONTINENTAL GIN COMPANY
BIRMINGHAM, ALABAMA



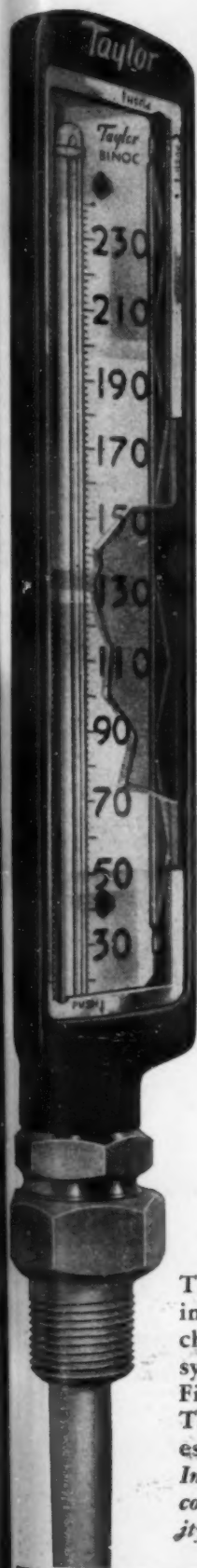
ATLANTA

DALLAS

MEMPHIS



Have you seen Taylor's NEW Industrial Thermometer?



1. **THE ONE-PIECE CASE** is practically fumeproof. Nothing to work loose. Shallower case makes easier reading through a wider angle of vision.
2. **INTERLOCKING BEZEL**, chromium-plated to resist corrosion, holds thick protective glass front against four wavy tension springs. The case itself is grooved to hold bezel in place securely.
3. **TENSION SPRINGS** are held in position by spring plates fastened under the scale by shakeproof screws. A rigid construction—rattleproof—dust-proof. Ideal construction to withstand vibration.
4. **CLEAR THICK GLASS** is used on all Taylor Industrial Thermometers to give maximum legibility and maximum protection to the thermometer tube.
5. **EASY READING BINOC TUBE . . .** All Taylor Thermometers with ranges up to 750°F. are equipped with triple-lens Binoc tubing which is now better than ever. The mercury column stands out vividly through a wide angle of vision. Binoc is a patented feature, exclusive with Taylor Instruments. Easy reading Binoc invites frequent reading.
6. **BOLD, EASY READING SCALE** stands out clearly against a sharply contrasting background.
7. **MANY STANDARD RANGES** within the limits of minus 40° and plus 950°F.
8. **WIDE VARIETY** of stem constructions available.
9. **PERMANENT TAYLOR ACCURACY . . .** Glass tubes are heat treated to remove strain, which greatly reduces breakage—and artificially aged to prevent calibration change later. Tubing has sufficient test points to assure accuracy over entire range. Scale is *individually graduated* for each tube.

These thermometers are not only used independently but also serve as a basic check on accuracy of bimetallic or tube system thermometers. Ask your Taylor Field Engineer for full information. Taylor Instrument Companies, Rochester, N. Y., and Toronto, Canada. Instruments for indicating, recording, and controlling temperature, pressure, humidity, flow and liquid level.


Taylor Instruments
 — MEAN —
ACCURACY FIRST

IN HOME AND INDUSTRY

★ KEEP ON BUYING U. S. WAR BONDS AND STAMPS ★

BAKER *Platinum Laboratory Ware*

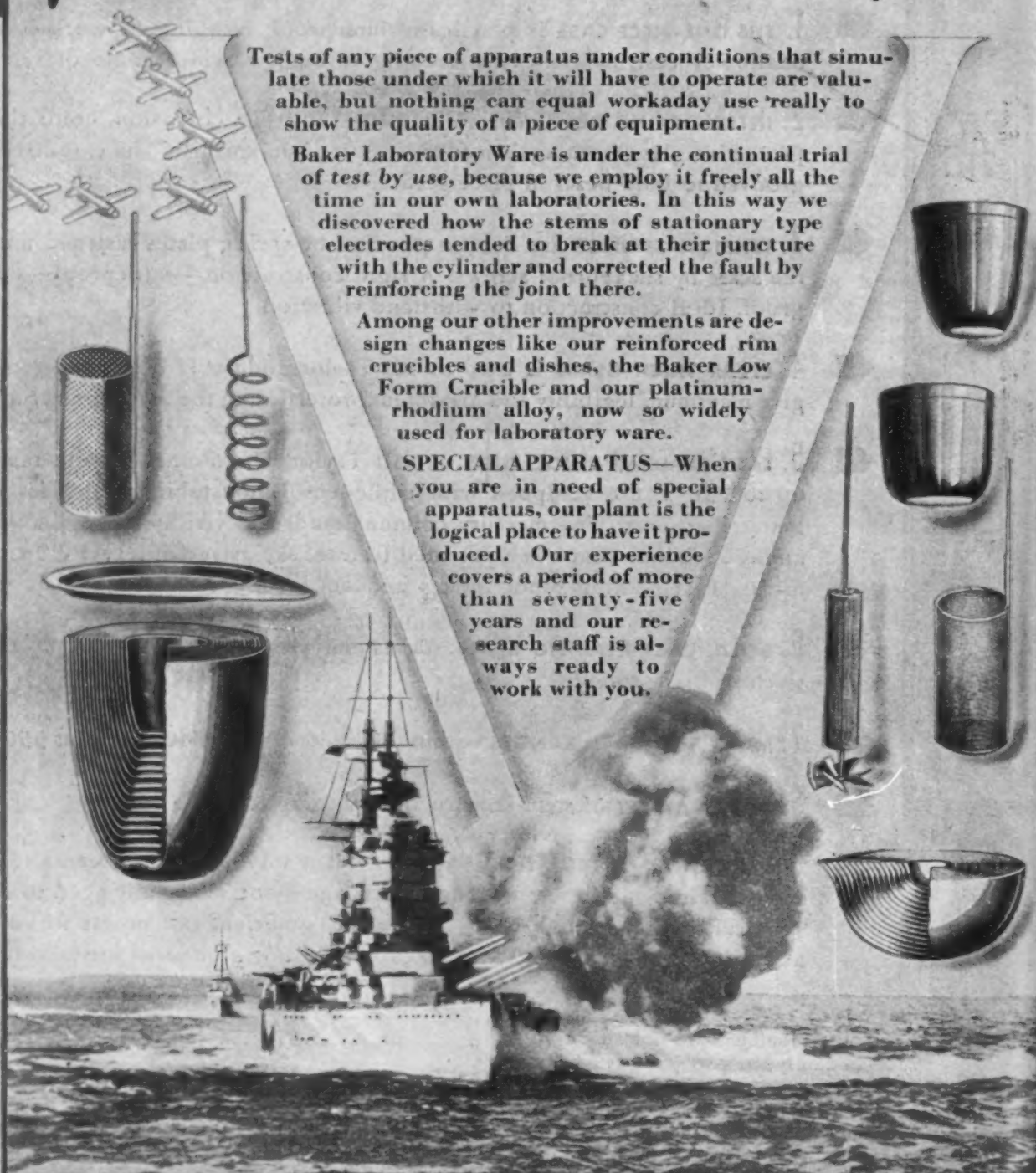
Tested by Use

Tests of any piece of apparatus under conditions that simulate those under which it will have to operate are valuable, but nothing can equal workaday use really to show the quality of a piece of equipment.

Baker Laboratory Ware is under the continual trial of *test by use*, because we employ it freely all the time in our own laboratories. In this way we discovered how the stems of stationary type electrodes tended to break at their juncture with the cylinder and corrected the fault by reinforcing the joint there.

Among our other improvements are design changes like our reinforced rim crucibles and dishes, the Baker Low Form Crucible and our platinum-rhodium alloy, now so widely used for laboratory ware.

SPECIAL APPARATUS—When you are in need of special apparatus, our plant is the logical place to have it produced. Our experience covers a period of more than seventy-five years and our research staff is always ready to work with you.



BAKER & CO., INC.

SMELTERS, REFINERS AND WORKERS OF PLATINUM, GOLD AND SILVER

113 Astor St., Newark 5, N. J.

NEW YORK

SAN FRANCISCO

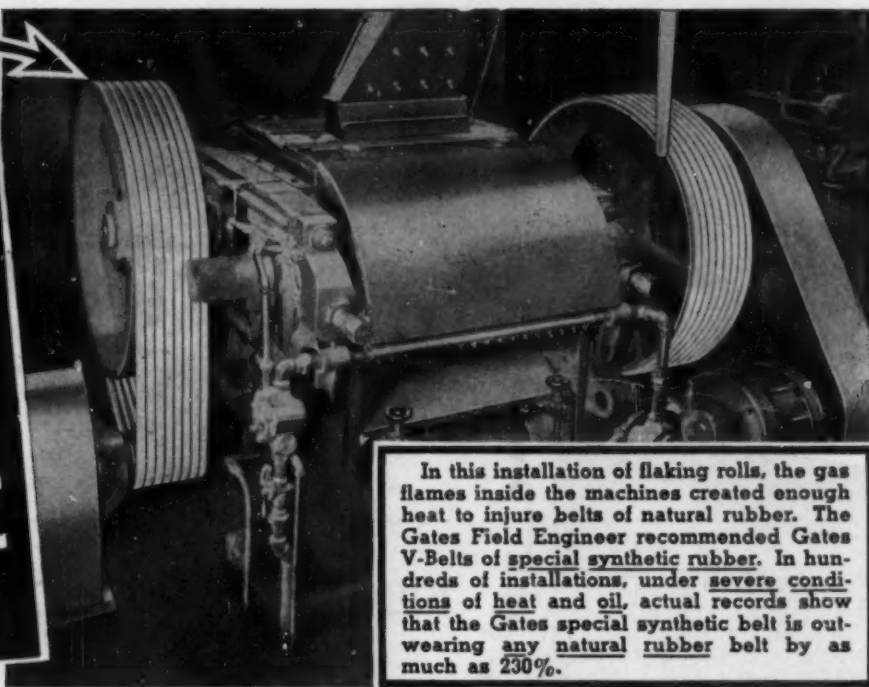
CHICAGO

Here

The Gates
Field Engineer

Recommended

GATES BELTS of Special SYNTHETIC RUBBER



In this installation of flaking rolls, the gas flames inside the machines created enough heat to injure belts of natural rubber. The Gates Field Engineer recommended Gates V-Belts of special synthetic rubber. In hundreds of installations, under severe conditions of heat and oil, actual records show that the Gates special synthetic belt is outwearing any natural rubber belt by as much as 230%.

He Can Tell You Whether You Need

- ① Synthetic Rubber V-Belts
- ② Steel Cable V-Belts
- ③ Cotton Cord V-Belts
- ④ Static-Safety V-Belts
- ⑤ Rayon Cord V-Belts

Whenever a drive in your plant appears to be wearing belts out faster than it should—just pick up your phone and call the Gates Field Engineer.

He is a specialist in drive operation and he can quickly diagnose any trouble you are having. In most cases he can correct that trouble very easily and without recourse to using V-Belts of special structure.

There are, however, countless drives where V-Belts having special characteristics will prove to be the most efficient and economical that you can use.

The flaking rolls, pictured above, are a case in point. For more than five years now, Gates has been making special synthetic V-Belts—and the records in hundreds of appli-

cations show that, under severe conditions of heat and oil, these special synthetic belts are wearing 2 times to 2½ times as long as any belt of natural rubber.

There are other types of drives on which V-Belts with load-carrying members composed of flexible steel cables—or of rayon cords—will prove to be the most desirable application. Again, a Static-Safety V-Belt may best fit your special needs.

In any case, the wisest move you can make is to phone your Gates Field Engineer. Your telephone directory will give you his number. He will put all of his specialized knowledge and experience at your disposal—and he will always recommend the practice that will be most efficient and economical for you.

4312.

THE GATES RUBBER COMPANY

Engineering Offices and Stocks in All Large Industrial Centers

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NEW YORK CITY
215-219 Fourth Avenue

ATLANTA, GA.
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2240 East Washington Boulevard

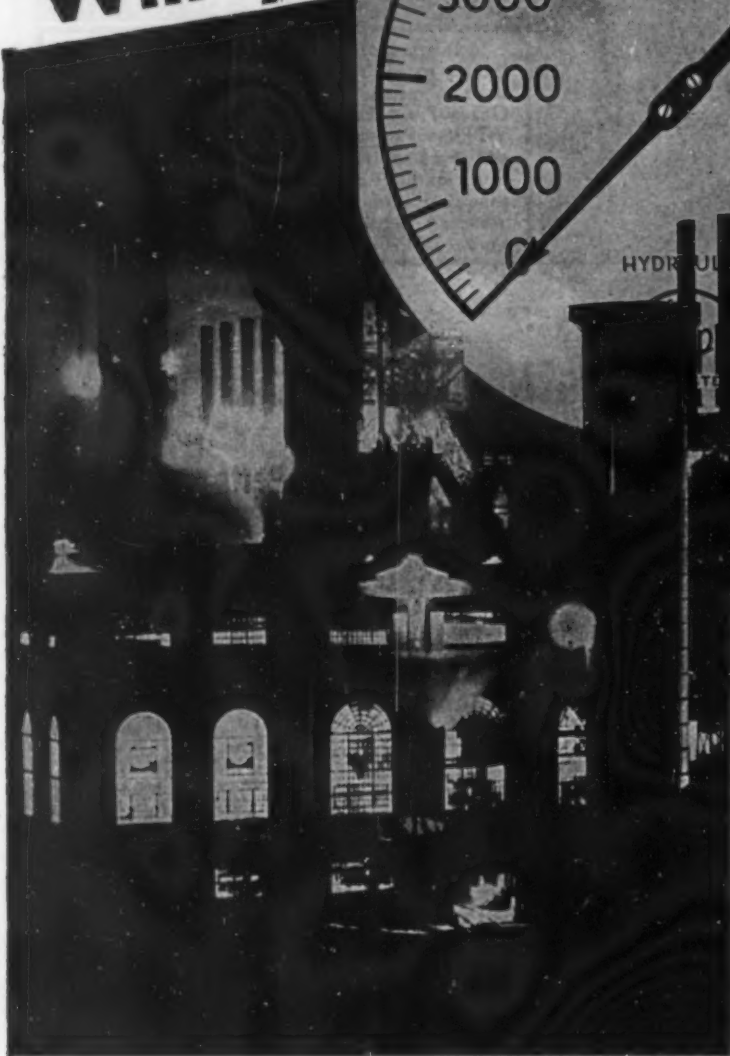
DENVER, COLO.
999 South Broadway

DALLAS, TEXAS
2213 Griffin Street

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1090 Bryant Street

Will your lights keep blazing?



pressure **GAGES**

PRESSURE GAGES FOR TOMORROW'S INDUSTRY

Today's battles of war are being won by those who are most intelligently using the best instruments of war.

Tomorrow's battles within industry will likewise be won by those adapting to their own problems the best available instruments of industry.

The Clapp Acragage is a precision-built indicating pressure gage with refinements and improvements that are exclusive. It is offered in standard models, or can be custom-built to your individual needs.

The highly trained Clapp Experimental Department will gladly work out with you now, exactly the gage you need to jump into the Post-War Period with a headstart on competition.

CLAPP INSTRUMENT COMPANY
WEBSTER MASS.



CHEMICAL BAGS

Tailor Made

to Meet the Individual
Requirements of
Your Products



SENSITIVE things to pack, chemicals often require bags that keep moisture out; some require bags that keep moisture in; others require bags that let your product breathe; while still others require bags that retain desirable aromas . . . repel objectionable odors. No one bag can serve this multitude of requirements successfully. That's why it pays to entrust your packaging problems to Chase.

Chase lined and combined bags are "tailor-made" to meet many individual requirements. They come in a variety of types and sizes, they are tough and strong, and give your products maximum protection against losses from shipping and storing.

To help you with your packaging problems, Chase maintains a corps of highly skilled engineers. These men are thoroughly acquainted with problems of packaging and are glad to recommend the proper type of container for your products. Take advantage of their knowledge and experience.

Mail the coupon at right for free Analytical Questionnaire that helps our research specialist solve your specific problem. No obligation, of course.



Send for our free Analytical Questionnaire

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NEW YORK	CLEVELAND	SALT LAKE CITY
DETROIT	PITTSBURGH	PORTLAND, ORE.
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PRODUCTION PROBLEMS ARE OUR DISH

PASS your hard-to-solve production problems along to Joyce—they're our dish. We don't wish to imply that we prefer the difficult assignments to the run-of-mill jobs—what we want to establish is that we've had such broad experience in production procedure and product improvement that we're confident we can help you materially in meeting your war contracts—and in your postwar planning. Whether it be the designing of special ma-

chines or the quantity production of products or parts, Joyce's extensive facilities are available to assist you.

Joyce's huge force of skilled craftsmen have proved themselves in maintaining a constant flow of war materials for the Army, Navy, Maritime and Aircraft services—and their ability to get things done has helped many of the country's leading industrial plants score enviable production records.

A Joyce representative will be glad to explain in detail the many phases of Joyce's design, assembly and fabricating service. If it can be made better, faster, more economically, Joyce "know how" will find the way.

★ *Hit Hitler Hard*
Buy Bonds for Bombs ★

JOYCE
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MANUFACTURERS OF PRECISION PARTS
FOR ALL KEY INDUSTRIES

BEHIND THE MAN ▶ BEHIND THE MAN ▶ BEHIND THE GUN



Backed by over 20 years' experience and a long list of "firsts" in tubing manufacture, The Babcock & Wilcox Tube Co. can furnish tubing to fulfill almost any requirements.

B&W Seamless Tubing is made in a complete range of carbon and alloy steels, including all the National Emergency Steels, and in sizes from 1/2 in. to

85/8 in. O. D. B&W Welded Tubing is available in carbon grades, in sizes from 3/4 in. to 4 in. O. D.

Along with this experience and complete range of facilities, Babcock & Wilcox Engineers are always available for consultation on any problem, no matter what its nature, where the selection of tubing requires scientific study of the job to be done.

★
BACK THE
ATTACK—
BUY MORE
WAR
BONDS!
★

THE BABCOCK & WILCOX TUBE CO.

SEAMLESS DIVISION
BEAVER FALLS, PA.

WELDED DIVISION
ALLIANCE, OHIO

Norton ALUNDUM Refractories Important To Many Chemical Industry Processes

Norton Company pioneered the manufacture of refractories from electrically fused alumina. The Norton trade-mark ALUNDUM which is applied to the raw material is likewise applied to the refractory shapes made from bonded fused alumina.

ALUNDUM grain of a very pure form (from 95.0% to 99.5% aluminum oxide) when mixed with the correct ceramic bond and given proper heat treatment results in refractory articles that have important and useful properties.

Properties of Alundum Refractories

Specific electrical resistance per cm.³

130 megohms at 528° C.

16 megohms at 730° C.

5.3 megohms at 892° C.

1.8 megohms at 1020° C.

Melting point—somewhat less than 2050° C. depending on the character of the mix.

Coefficient of expansion—0.000068 per degree C.

Porosity—variable

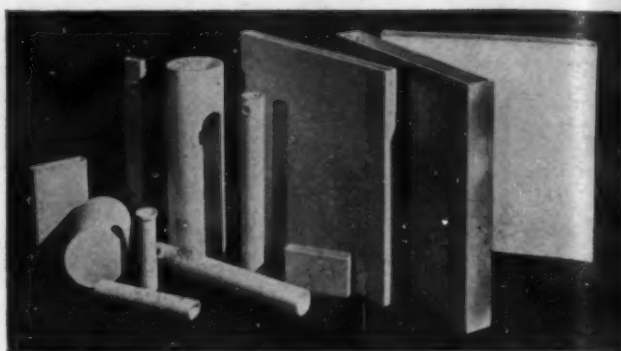


Norton ALUNDUM Laboratory Ware

Fused alumina itself is a very inert substance, and the bonded articles are not readily attacked by chemically active solutions. For this reason ALUNDUM Ware is very useful for filtering strong acids. Other important uses of ALUNDUM Ware are for electrical construction and the protection of metallic resistors from corrosion.

ALUNDUM bonded ware has high heat conductivity, considerable electrical resistance at high temperatures, and the mechanical strength of the material is relatively great. ALUNDUM Cement mixtures offer a greater resistance to the passage of electricity, especially at the higher temperatures, than quartz, porcelain and similar materials. This is also true of bonded ALUNDUM shapes such as bricks, tubes, cores, etc.

ALUNDUM Laboratory Ware has been used successfully for many years in filtering and extraction work in laboratory determinations because of its great resistance to reagents and solvents. It is unaffected by all organic solvents, and only attacked by hydrofluoric acid and strong caustic solutions. The regular shapes (dishes, crucibles, thimbles, filter cones, etc.) are made in three degrees of



ALUNDUM Diaphragms For Electrolytic Processes

porosity: RA84 dense, RA360 medium, RA98 coarse. All Norton Laboratory Ware can be obtained through your regular supply house.

ALUNDUM Diaphragms are being used as porous portions between anode and cathode in various electrolytic processes. Their characteristics are such as to make them satisfactory for use both in electroplating and also in the much more highly refined electro-organic processes of the electro-chemical industry. Due to their physical characteristics they add very little to the overall electrical resistance of the cell.

Of great importance in many cases is the permeability of the diaphragms to fluids. ALUNDUM Diaphragms can be made in a range of permeabilities the limits of which would meet the permeability requirements of almost any commercial electrolytic process.



ALUNDUM Aggregates, Pellets, and Tubes For Catalysts

ALUNDUM Aggregates, Pellets and Tubes made with closely controlled porosity and pore size have been widely used both as a catalytic agent and carrier. Here again the chemical stability and physical characteristics of ALUNDUM coupled with Norton Company's wide knowledge of methods of manufacture has led to the development of a product having a wide and useful application in chemical processes.

NORTON COMPANY
Worcester 6 Massachusetts

Shake Hands *with* **SERVICE!**



THERE'S only one kind of construction and erection service of interest to industry today . . . or any day. It's the service that insures prompt completion, thorough satisfaction, and, on the part of the finished job, service for years to come.

With trained personnel, modern equipment, and broad experience, Graver is able to offer to the Process Industries a complete service . . . construction, erection, dismantling, and re-erection . . . that will fulfill every requirement. That's no idle boast . . . it's a statement of fact backed by an impressive record of achievement. And, as an added service, we can supply such steel plate equipment as may be desired, fabricated by our manufacturing division to meet your most exacting specifications.

Let us discuss your construction and erection problems with you. We'll be glad to submit cost estimates without obligation.

GRAVER

**INDUSTRIAL
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AND
ERECTION**

Construction Division of
GRAVER TANK & MFG. CO., INC.

4811-57 Tod Ave., East Chicago, Ind.
NEW YORK CATASAUQUA, PA. CHICAGO TULSA



NICKEL AIDS THE CONSTRUCTION INDUSTRY *to KEEP 'EM WORKING!*

Engineers who design construction equipment can take pride in the construction industry's greatest achievement...its part in building America's "Arsenal of Democracy."

For they contributed to that amazing success, even long before the war started. They designed the tools with which the job was done...found ways to make equipment durable, and thus prevented many a breakdown of machinery at this critical time when nothing must interfere with the drive toward Victory.

Familiar to them, as a means of giving longer life to construction equipment, is the widespread use of Nickel Alloys. Those engineers have learned from long experience that Nickel imparts toughness, strength, and corrosion resistance to ferrous and non-fer-

rous metals, and thus assures improved performance under the most severe conditions.

Among them, as with men in many other industries, the saying is that "a little Nickel goes a long way" toward increasing dependability of machine parts—from gears to scraper blades, from dipper teeth to crusher rolls.

The experience of contractors, engineers, and machine operators in the field supports this conviction of the designing engineers...proves that the products of leading manufacturers stand up longer under the stress of exacting service.

It has been the privilege of INCO engineers and metallurgists to cooperate with the construction industry for many years. To men in all industries who desire assistance in the selection,abrica-

tion, and heat treatment of ferrous and non-ferrous alloys, the International Nickel Company cordially extends an offer of counsel and data.

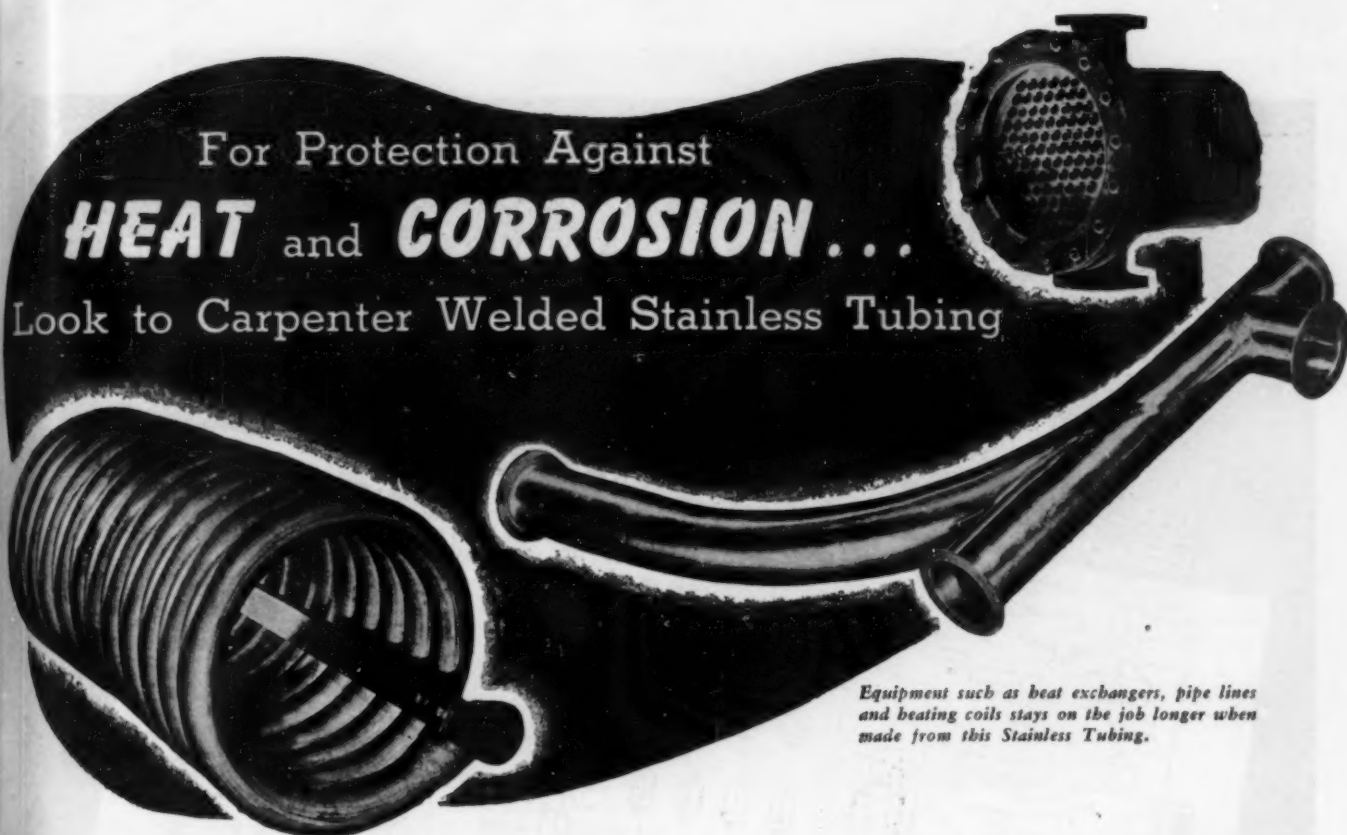
New Catalog Index

New Catalog C makes it easy for you to get Nickel literature. It gives you capsule synopses of booklets and bulletins on a wide variety of subjects—from industrial applications to metallurgical data and working instructions. Why not send for your copy of Catalog C today?



★ *Nickel* ★

THE INTERNATIONAL NICKEL COMPANY, INC., 67 Wall St., New York 5, N.Y.



For positive protection against specific corrosive elements, and oxidation from high temperatures, it will pay you to learn more about this tubing.

In many plants, processes are completed faster because Carpenter Welded Stainless Tubing helps to reduce maintenance time. And because the inside surfaces are smooth, no tiny particles can lodge and give corrosion or product contamination a foothold. And this tubing is easy to clean, easy to keep clean.

For help with your special problems where corrosion and heat present processing difficulties, consider Carpenter as your general headquarters for useful information about Stainless Tubing. Much of our pioneering work and years of experience can probably be put to good use in solving your problems. Drop us a line today.

USE THIS PRINTED HELP TO GET THE MOST FROM THE STAINLESS TUBING YOU USE!



This convenient file folder provides some of the basic information you need when considering the use of Stainless Tubing. It gives data on corrosion resistance, physical properties of Carpenter Welded Stainless Tubing, sizes and shapes available, etc. A note on your company letterhead will start your copy on its way, so let us hear from you today.

HERE'S WHY THIS STAINLESS TUBING IS EASY TO FABRICATE . . .

Uniform walls throughout mean that lighter gauges can be used without sacrificing strength. And lighter gauges permit savings in weight, as well as lower costs.

THE CARPENTER STEEL COMPANY
Welded Alloy Tube Division • Kenilworth, N. J.

Carpenter

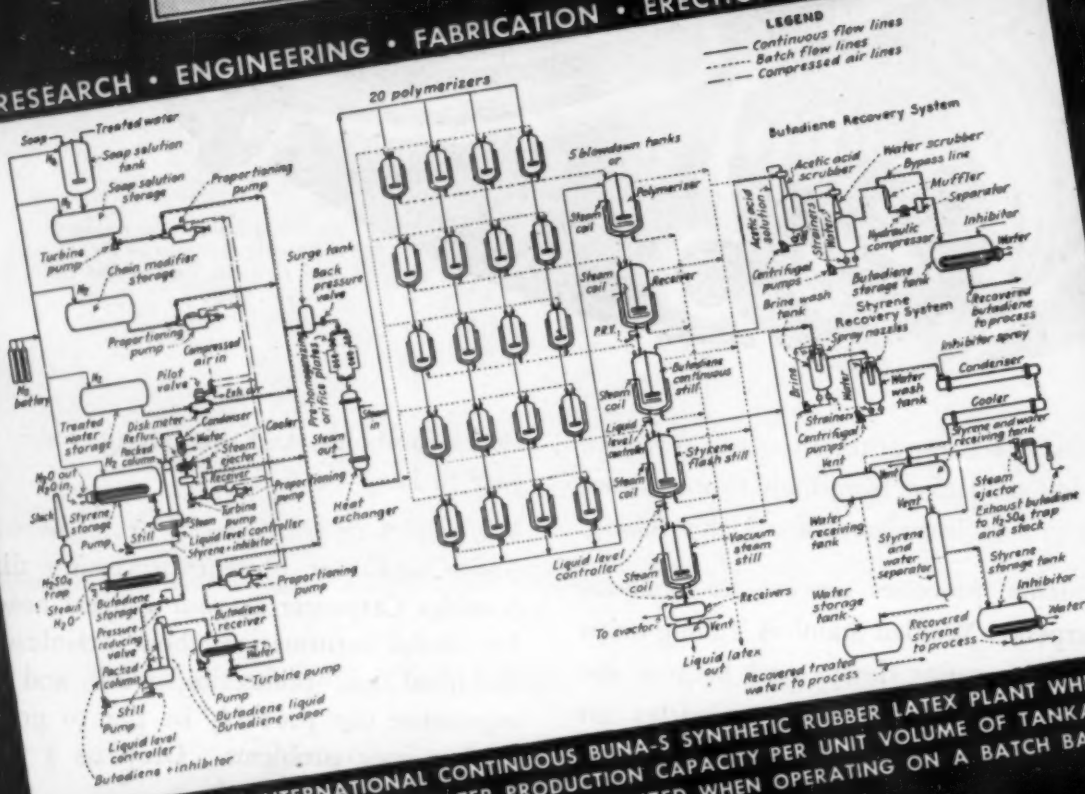
WELDED

STAINLESS TUBING

CHEMURGY-INTERNATIONAL

PIONEERS AND SPECIALISTS IN THE CHEMICAL ENGINEERING OF CONTINUOUS PROCESS PLANTS

RESEARCH • ENGINEERING • FABRICATION • ERECTION • INITIAL OPERATION



THIS IS A CHEMURGY-INTERNATIONAL CONTINUOUS BUNA-S SYNTHETIC RUBBER LATEX PLANT WHICH YIELDS A 40% GREATER PRODUCTION CAPACITY PER UNIT VOLUME OF TANKAGE THAN IS REALIZED WHEN OPERATING ON A BATCH BASIS.

A FEW OTHER CHEMURGY-INTERNATIONAL CONTINUOUS PROCESSING ACHIEVEMENTS

MIXING • Dissolving of soda-ash; bleaching of tallow; neutralization of corn oil; thinning of phenol-formaldehyde resin; alkylation of gasoline; emulsification of butadiene and styrene with water; saponification of hardened fish oil.

DISTILLATION • Fractionation of mixed fatty acids; fractionation of chlorinated benzene derivatives; fractionation of isopropyl alcohol and tetrachloroethane.

GRINDING • Paint and ink pigments; potassium nitrate; barium sulphide; glass cullet.

COMPLETE PROCESS PLANTS • Phenol-formaldehyde laminating resin; dibutyl phthalate; reduction of nickel salts to metallic nickel; spent nickel catalyst and fats recovery; glycerine splitting from fats; tetrachloroethane from chlorine and acetylene; formaldehyde from ethyl alcohol.

DRYING • CALCINING • KILNING • SOLIDS BLENDING, ETC.

WRITE FOR { "A MATHEMATICAL APPROACH TO CONTINUOUS COMBINING AND REACTING"
"BATCH-CONTINUOUS PROCESS FOR BUNA-S"
THE "CHEMURGY-INTERNATIONAL CONTINUOUS PLANTS" BROCHURE }

INTERNATIONAL ENGINEERING, INC.
Constructors
DAYTON • OHIO

THE CHEMURGY DESIGN CORP.
Engineers
GRAYBAR BLDG. • NEW YORK CITY

How To Keep Goggles CLEAN



Improved Ful-Vue
Goggle (Patented)



New Super Dura-
lite-50 Goggle

STERILIZE THEM . . . to Avoid Face and Eye Infection

To avoid eye infection, dermatitis, and skin rashes, goggles should be sterilized at definite, regular intervals. Before a pair of goggles worn by one worker is turned over to another, it should be sterilized. There are many effective methods of sterilization. Six of the simplest, most effective methods are described below. If additional information on this subject is desired, it may be obtained readily from The National Safety Council.



Six Typical Methods of Sterilizing Goggles

NOTE: Before sterilizing, clean goggles thoroughly with soap and hot water. Scrub eyecups, lens rings, side screens with stiff brush.

- 1 Immerse goggles in a moist atmosphere of an antiseptic gas (e.g. formaldehyde) at room temperature for not less than 10 minutes.
- 2 Immerse in boiling water for 5 minutes.
- 3 Expose to real, live steam for at least 5 minutes.
- 4 Soak for 10 minutes in formalin solution (one part 40% formaldehyde solution to 9 parts water). Rinse well in boiling water.
- 5 Dip in a 70% solution of denatured alcohol and allow to dry.
- 6 Dip in a 3% cresol solution for a few minutes, then wash in water very thoroughly. When this method is used, all traces of cresol must be removed before goggles can be safely worn.

SUGGESTIONS

Sterilization should be assigned to a person who thoroughly understands the work . . . under supervision of doctor, nurse, or safety engineer.

Person doing the work should be fully protected. Goggles should be handled with gloves.

Until re-issued, seal goggles in paper envelope marked: "Sterilized for Your Protection."

WIPE THEM CLEAR

to Avoid Eye Strain and Inaccurate Work

Dirty lenses can cause eye strain and fatigue that result in poor work. Clogged side-screens cause lenses to fog. For clear, comfortable vision, and to reduce rejects, goggles should be cleaned daily. Screens and lenses both should be washed daily with soap and water, rinsed, and carefully wiped with a clean cloth that is used for this purpose only. Cloth should be free from dirt and grit, and should be frequently replaced with a new one. Goggles should be treated like regular glasses . . . kept sterile-clean and clear of dust, dirt, and oily or greasy fingerprints.

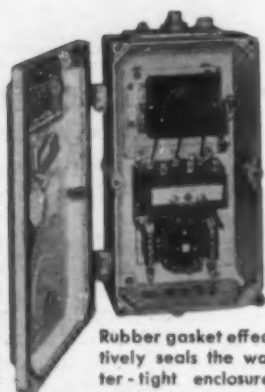
American  Optical

COMPANY
SOUTHBRIDGE, MASSACHUSETTS

These 6 Combination Starters NEVER need any CONTACT MAINTENANCE



Bulletin 712 combination starter in standard duty enclosure.



Rubber gasket effectively seals the water-tight enclosure.

Control troubles and contact maintenance will never shut down this big three-stage solvent washing machine now running in a vital war plant. Its six Allen-Bradley combination starters (consisting of solenoid starter and disconnect switch in one cabinet) are equipped with double break, silver alloy contacts that never need any filing, cleaning, or dressing. The oxide which may form on them is always a good electrical conductor.

Each starter has only one moving part . . . the plunger that opens and closes the double break contacts with a straight line, vertical motion. All flexible jumpers, pins, pivots, hinges, and bearings are eliminated. There's nothing to stick, break, wear, or adjust. No other starter is so simple.

For a lifetime of trouble-free operation, economy, convenience, and safety, specify Allen-Bradley Combination Starters.

Allen-Bradley
Company



1337 S. First St.
Milwaukee 4, Wis.

An Enclosure for Every Application

General Purpose—This enclosure is of bonderized sheet steel. Black enamel exterior. White enamel interior. Both are infra-red "cured" for longer life. Knockouts on all sides. The general purpose starter is also made in a low-cost, semi-dust-tight construction for locations where dust conditions are light.

Water-Tight—Used wherever splashing water or moisture laden air is encountered. Enclosure is of cast iron, cadmium plated against corrosion. Live rubber gasket seal between cover and base excludes moisture. Threaded conduit openings provided at top and bottom.

Hazardous Atmosphere—Cast iron enclosure is effectively sealed by wide machined flanges on base and cover. Black enamel outside, white inside. Satisfies Underwriters' Laboratories' requirements for Class 2, Group G hazardous dust locations.

Flush Mounting—Both open and closed types for mounting in machine tool bases or in plastered walls. Neat and compact with generous wiring space. Easy to install. Flush plate is made of sheet steel and finished in machine tool gray.

ALLEN-BRADLEY

SOLENOID MOTOR CONTROL

Balanced Flow

WAS A
TURNING POINT IN
SURFACE CONDENSER
DESIGN

ROSS

When Ross introduced Balanced Steam Flow, by means of split tube support plates, it was a great turning point in Surface Condenser design. For the first time, a simplified system for equalized pressure through the bundle was achieved, embodying these outstanding features:

★ Congestion at entrance to a cool section relieved

★ Pressure loss across any portion of the bundle reduced to a minimum

★ Practically uniform pressure drop for all paths through the main tube banks

★ Entire surface able to condense steam actively with the maximum possible temperature difference

Because of these outstanding advantages, more and more condenser manufacturers are turning to split tube support plate construction.

So, again an early Ross discovery (introduced simultaneously with Ross divided tube banks) has influenced the trend of modern Surface Condenser design . . . another "First" accounting for Ross leadership today!

ROSS HEATER & MFG. CO., Inc.

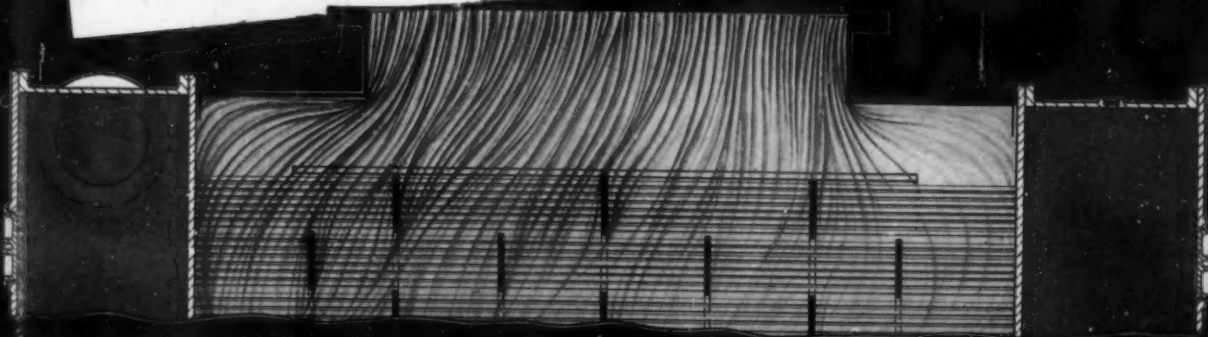
Division of AMERICAN Radiator and "Standard" Sanitary Corporation

GENERAL OFFICES & PLANT

1411 WEST AVENUE BUFFALO 13, N. Y.

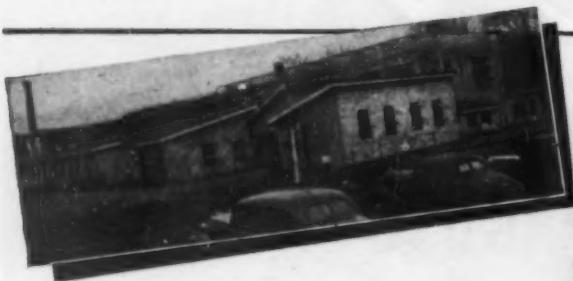


Divided and Offset Tube Support
Plates, Condensate Trays and Air
Cooler Shells.



Balancing Flow within the Tube Bundle

Your Answer...Here?

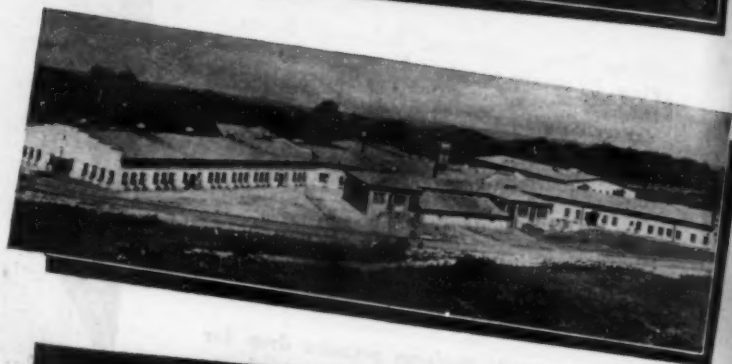


These 3 Modern Plants are the largest facilities exclusively devoted to the disintegration of refractory metals and other materials.

With the Finest Equipment these facilities are busy today reducing magnesium to powder form for use in parachute flares, illuminating signals and tracer ammunition.

Operated by highly skilled craftsmen Magna is turning out vast quantities of this vitally needed magnesium powder.

Under Rigid Control ...all production is tested and checked to maintain uniform high quality standards.



And Tomorrow will find Magna prepared to deliver finest quality metal powders in whatever quantities are needed to assure low cost quality fabrication. Management executives, sales, and design engineers are invited to consult with Magna *now*.

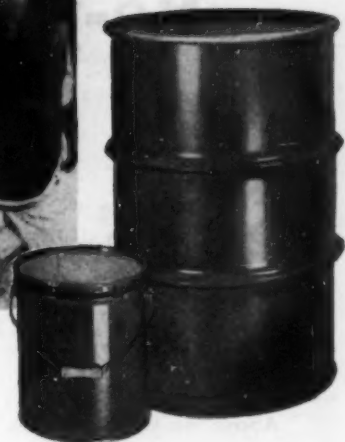


MAGNA

MANUFACTURING COMPANY, INC.

MANUFACTURERS OF MAGNAFLAKE METAL POWDERS

444 MADISON AVENUE, NEW YORK 22, N. Y.



Steel drums and pails.
Capacities 2 gal. to
55 gal.

Supplies Move up Front

Snaking along the jungle trail under guard, this supply train is delivering the goods. Foods, munitions and petroleum products arrive fresh and uncontaminated because they are packed in

STEEL CONTAINERS

Formerly Wilson & Bennett Mfg. Co.

INLAND STEEL CONTAINER CO.

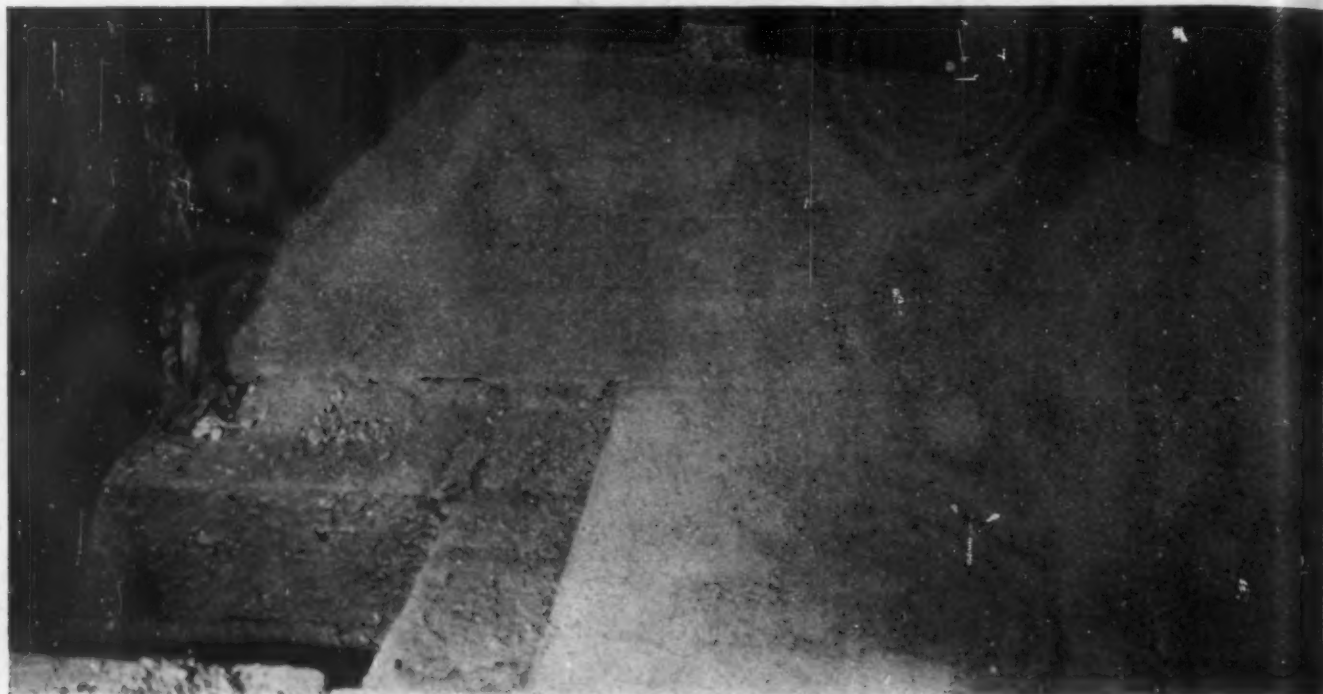
C O N T A I N E R S P E C I A L I S T S

6532 Menard Avenue, Chicago 38, Illinois

PLANTS AT: CHICAGO • JERSEY CITY • NEW ORLEANS • RICHMOND, CALIF.



THIS is a reprint of a Corhart advertisement in glass-industry magazines. But perhaps it will give you an idea as to how Corhart Electrocast might serve YOU. For further facts about Electrocast, turn to "Corhart," in either the Chemical Engineering Catalog, or the Metal Industries Catalog.



Re-paved Electrocast Bottom Saves Major Repair!

SOMETIME ago we published the case history of a working-end in which an old and badly worn clay bottom had been re-paved with Corhart* Electrocast, and how the Corhart sidewalls had thereby been saved for at least another campaign

Above we show a photo of that paved working-end bottom after one fire of approximately 24½ months. Note that the paving is "just as good as new"—and that after a few minor changes in sidewalls, the furnace is ready for another run! Practically no wear on the Corhart paving is apparent, and it is believed that the construction has and should contribute to improved glass quality.

Thus the Corhart Electrocast re-paving has now again saved a major repair—the original Corhart working-end sidewalls

have now served for four fires approximating 7½ years—and the operator has saved the time, the materials and the PRODUCTION that would otherwise have been lost by destroying and replacing the old working-end bottom and sidewalls.

The economies represented by this type of installation are so obvious that every glass manufacturer should be interested when he knows the facts. These facts we would be glad to discuss further with you. . . . Corhart Refractories Co., Incorporated, 16th and Lee Streets, Louisville, Kentucky.

*Not a product, but a registered trade-mark.



**CORHART
ELECTROCAST
REFRACTORIES**

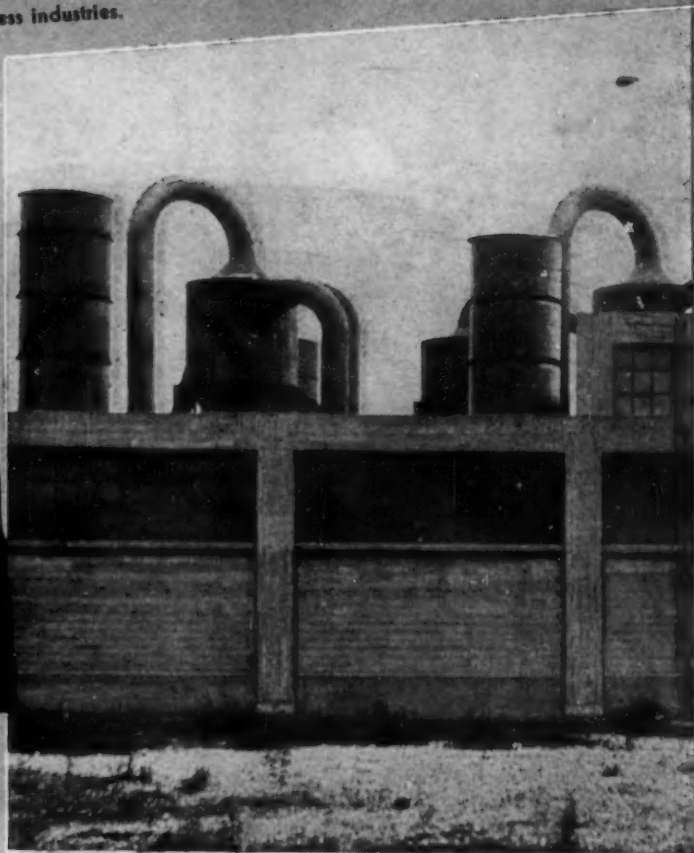
THE PROBLEM

In processing cocoa beans, they are ground to a pre-determined fineness, passed through rotary dryers and pneumatically conveyed to storage bins. Cyclone collectors, located above the bins, receive the conveyed material which is discharged into bins below the cyclones. The conveying air is released through openings at the top of the cyclone, exhausting minute quantities of fine dust and odors which constitute a plant and community nuisance.

THE SOLUTION

To eliminate this nuisance, a leading cocoa processor installed a Schneible Multi-Wash System with the result that both dust and odors were completely controlled.

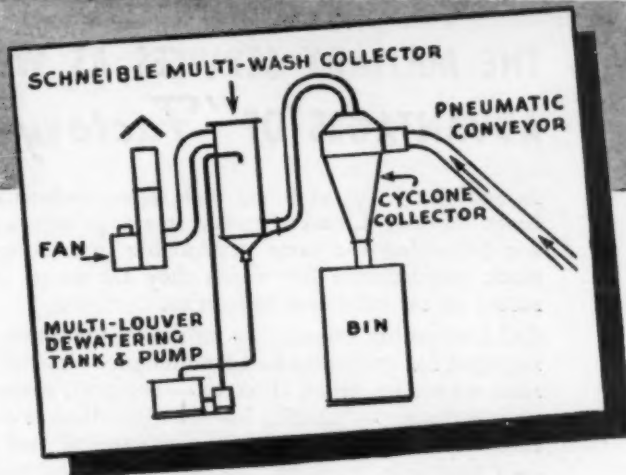
No. 3 in a series of case studies of dust and fume conditions in the process industries.



*Whatever Your Dust
and Fume Problem—
Schneible Has a Sound
Answer*

Frequently Schneible Multi-Wash Collectors have been installed to supplement or replace dry dust collecting methods which had not proved adequate to abate the nuisance involved. The multi-wash principle, as applied in Schneible equipment, removes the odors wherever they are due to the escape of very fine particles of matter contained in the material handled.

When the Schneible System of Dust Collection is used, there is no accumulation of dust to create another dust problem at the disposal point. In Schneible systems, the dust is carried away in the form of sludge. Dewatering equipment renders the water or other cleaning liquid available for repeated use in the collector and in many installations provision is made for the recovery of valuable materials.



The dusts and fumes collected by the hundreds of Schneible installations in process plants include silica, lime, carbon, gypsum, magnesium, starch, varnish, sulphite, alkali, ammonia, cocoa, etc.

Write us about your dust and fume problems.

CLAUDE B. SCHNEIBLE CO.

3957 Lawrence Ave., Chicago, Ill.
Engineering Representatives in Principal Cities



SCHNEIBLE

DUST, ODOR AND FUME CONTROL EQUIPMENT

CHEMICAL & METALLURGICAL ENGINEERING • DECEMBER 1943 •

- ★ CENTRALIZED RESPONSIBILITY ★ OPERATING ECONOMY
- ★ ONE SOURCE OF SUPPLY ★ SPEED OF INSTALLATION



THE MILITARY SERVICES AS WELL AS INDUSTRY RECOGNIZED THE ADVANTAGES OF *"Factory-Packaged"* STEAM GENERATORS

In military bases at home and remote advance bases abroad, Cleaver-Brooks steam generators are delivering the same dependable 'round-the-clock performance for which they are noted in scores of essential war industries.

Quick steaming capacity — minimum manpower required for operation and maintenance—cleanliness, no smoke, ashes, clinkers — compact, space-saving design — simple, low-cost installation — efficiency (saving shipping and storage of fuel) — a complete "package" — factory-finished and tested in every detail — these advantages of Cleaver-Brooks oil-fired steam generators were quickly recognized by military authorities. Centralized responsibility for dependable manufacture — a single, reliable source of supply and maintenance — were added factors that won preference for Cleaver-Brooks steam generators.

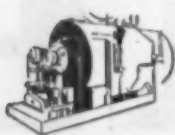
Steam generators are only one of several types of equipment being built by Cleaver-Brooks for wartime needs. Mobile water distilling, disinfecting and sterilizing units, portable shower-bath units, bituminous heating equipment embody the same efficient principle of oil firing.

The engineering competence and manufacturing skills which have qualified us to serve our government and essential industries today . . . will be devoted to the building of equally efficient equipment for tomorrow.

CLEAVER-BROOKS COMPANY
5108 N. 33rd STREET MILWAUKEE 9, WIS.

Cleaver-Brooks STEAM GENERATORS

CLEAVER-BROOKS PRODUCTS INCLUDE:



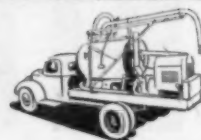
Steam Generators



Food Dehydrators



Tank Car Heaters

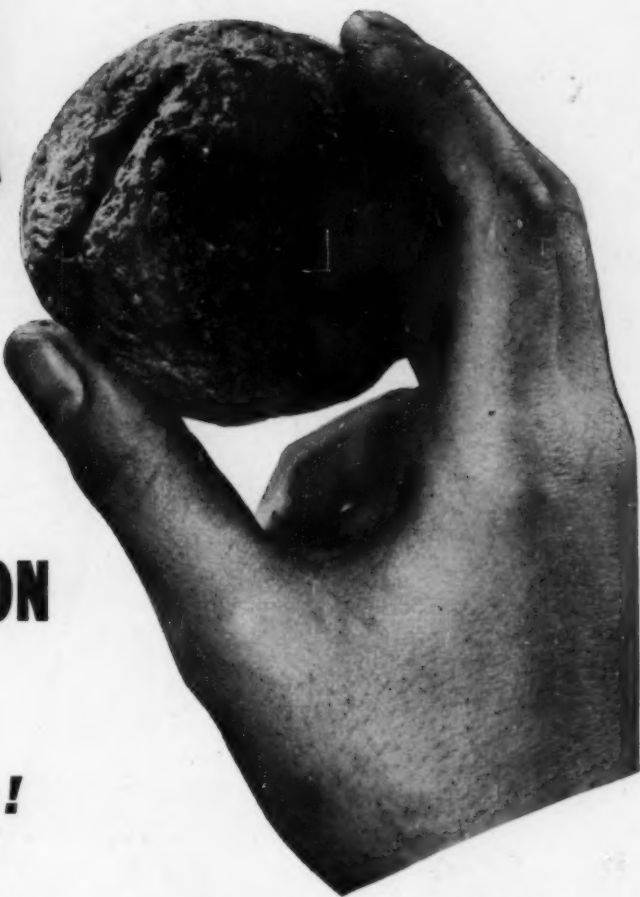


Bituminous Boosters



Special Military Equipment

FACTS YOU MAY NOT KNOW ABOUT EAGLE MINERAL WOOL INSULATION



EAGLE SUPER "66" INSULATION INHIBITS RUST

—razor blade test shows!

Bury a shiny new razor blade in a wet ball of Super "66"—Eagle-Picher's outstanding Insulation for temperatures up to 1800° F. Let ball and blade stand several weeks. When removed, notice how free from rust the blade is.

No trick of parlor magic... but proof positive that this insulating cement is not merely non-corrosive, but actually helps inhibit rust! And its insulating efficiency is remarkably outstanding.



Springy Ball Structure

Secret of the sensational insulating efficiency of Eagle Super "66" lies in the springy pellets of Eagle Mineral Wool that are its basic ingredient. After the insulation is applied,

this springy structure is still retained. Pellets contain millions of dead air cells which do not crush down. Full efficiency is maintained—coverage is increased, and shrinkage held to a minimum.

All Purpose—and it's Reclaimable

Eagle Super "66" can be applied to practically all heating equipment. It requires no special tools; exceptional workability means low installation cost. And when used on temperatures up to 1200° F., it may be removed, reworked and reused if desired!

We will send on request full particulars on Eagle-Picher High Temperature Insulations, and show how they will save you money and fuel. Current demand is very heavy, but we are endeavoring to fill all orders without undue delay.

EAGLE-PICHER HIGH TEMPERATURE INSULATIONS

Eagle Super "66" Plastic Insulation
Eagle Supertemp Blocks
Eagle L-T Felts
Eagle Blankets



Eagle Finishing Cements
Eagle Loose Wool
Eagle Insulseal
Eagle Insul-stic

THE EAGLE-PICHER LEAD COMPANY, Cincinnati, Ohio

FROM THE BLACK WOODS OF THE



EAGLE
100% 100% 100%
100% 100% 100%
100% 100% 100%



NATION
Spec
1632

Magnum
storage a
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hyperpictu
parts 5,0
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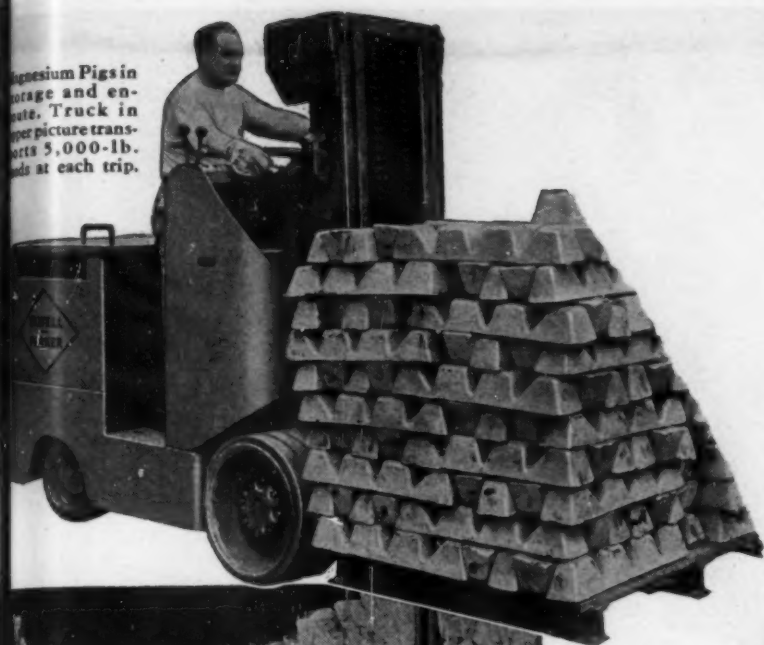
The E
228 S

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P

HEMI

Magnesium Pigs in storage and enroute. Truck in picture transports 5,000-lb. loads at each trip.



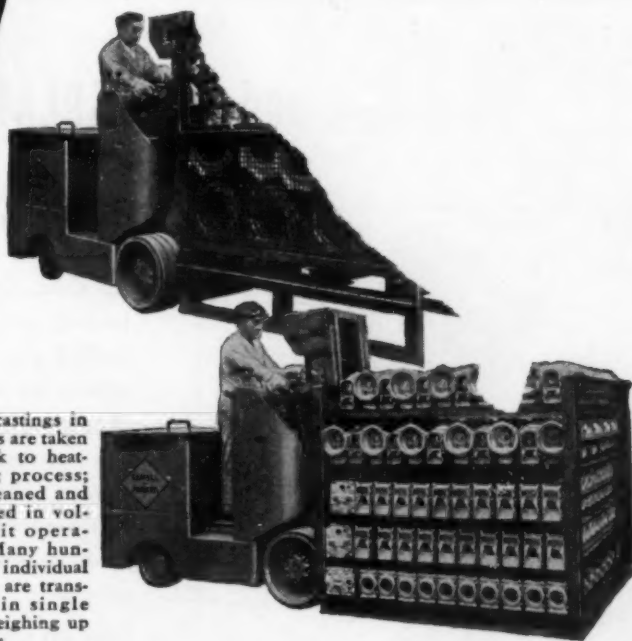
goes
Modern

★ And now Magnesium, newest of industry's great metals—with modern Elwell-Parker Trucks to transport it through every process from Pigs to Planes! Amazingly light—yet a thousand magnesium castings make an overhung load to test the mettle of *any* truck.

Leading producers follow the logical trend in selecting Elwell-Parkers to transport their top-volume loads. Logical—because Elwell-Parker Power Industrial Trucks for years have speeded the handling of Iron, Steel, Aluminum, Copper, Lead, Zinc—and hundreds of other materials, parts and supplies beside.

What bigger loads do *you* want to handle faster—more safely—more cheaply? Elwell-Parker will design a Truck System to help make yours a low-cost plant. Better start planning now.

The Elwell-Parker Electric Company,
228 St. Clair Ave., Cleveland 14, Ohio.



Rough castings in big racks are taken by Truck to heat-treating process; then cleaned and redressed in volume unit operations. Many hundreds of individual castings are transported in single loads weighing up to 5 tons.

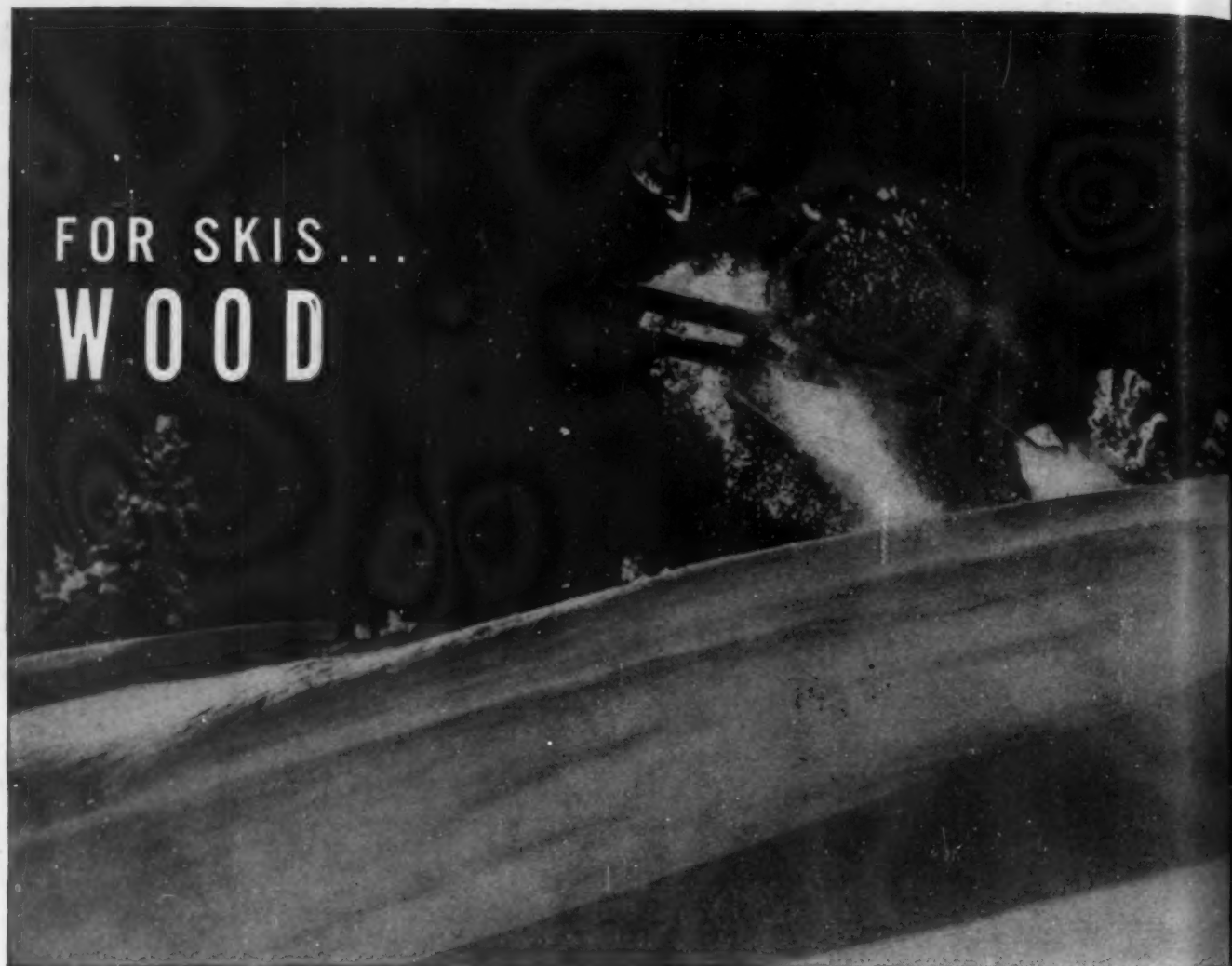
ELWELL-PARKER

POWER INDUSTRIAL TRUCKS AND CRANES

1893

1943

FOR SKIS...
WOOD



and for INSULATION ... *85% Magnesia*



Be they the crude barrel-stave variety of the boy who makes his own, or the beautifully laminated products of the professional ski-maker, wood is the material of which skis are made. Time has shown that for lightness, strength, resilience, workability and other physical characteristics, wood is the *one* best material for the purpose.

Likewise, in the field of pipe

and boiler insulations, there is but *one* material that has been proved through more than half a century to be best suited for such services — namely, 85% Magnesia. Its time-defying high thermal efficiency and its ability to withstand the hazards of industrial use have made it the Standard Insulation.

It will pay you to continue to specify Ehret's 85% Magnesia.

EHRET MAGNESIA



MANUFACTURING CO.
VALLEY FORGE, PENNA.

...THERE IS AN EHRET DISTRIBUTOR OR CONTRACTOR IN EVERY INDUSTRIAL AREA

You Get

INSTANT ACTION

POSITIVE CONTROL

LOWER UPKEEP

LONGER SERVICE

with **HOMESTEAD**

Quarter-Turn Valves

INSTANT ACTION because a Quarter-Turn *fully opens or closes* these valves. They operate 16 to 28 times *faster* than screw-stem types.

POSITIVE FLUID CONTROL because cam presses seating surfaces firmly together in closed position, yet valve operates freely. Sealed bottom, bonnet and stem, prevent wasteful, outside leakage.

LOWER UPKEEP AND LONGER SERVICE because seating surfaces are protected in the closed position and turned completely out of the fluid path in the open position. Thus shielded from corrosion or erosion by fluids, longer life is assured.

HOMESTEAD QUARTER-TURN VALVES are made in sizes, types and metals for most of your valve needs; for pressures to 3000 pounds and temperatures to 750 degrees F. Consult our engineering department for special valves designed to your own specifications. Write for copy of Valve Reference Book No. 38.

Maritime's two-flag, highest production award to our men and women making valves for the Victory Fleet.



STRAIGHT-WAY



THREE-WAY



FOUR-WAY

HOMESTEAD VALVE MFG. CO.

P. O. BOX 13

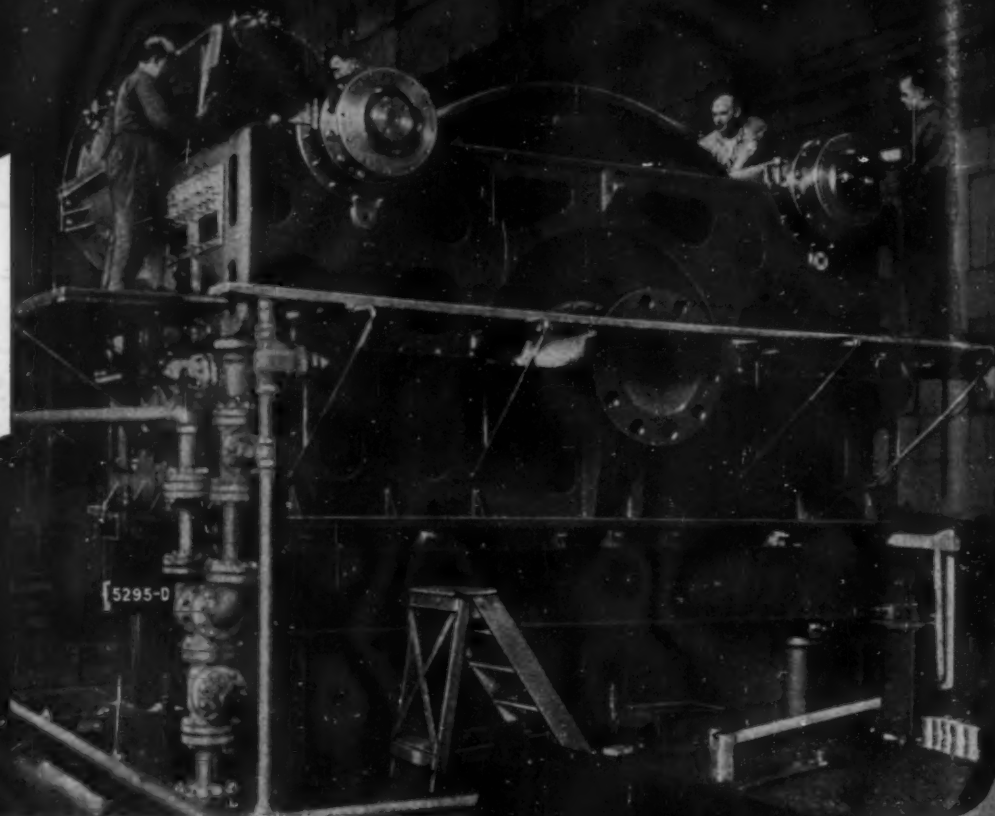
CORAOPOLIS, PENNSYLVANIA

CHEMICAL & METALLURGICAL ENGINEERING • DECEMBER 1943 •

**PARTS
ARE
GAGED**

*before
and
after*

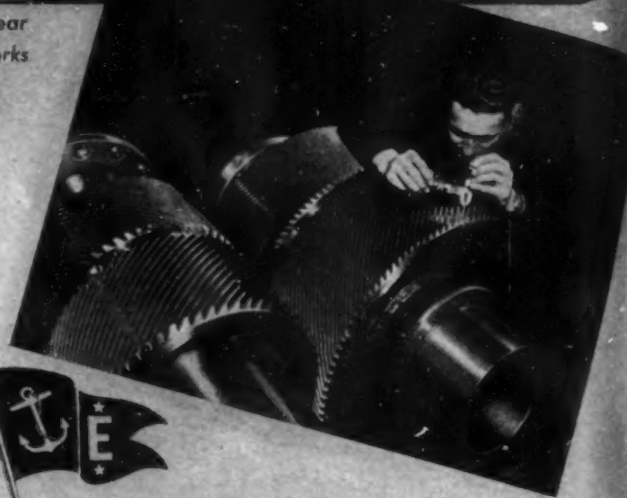
**THE
TEST
RUN**



Double helical ship propulsion gear
on test floor at the De Laval Works

In the De Laval Works each part of a machine is manufactured to limit gages on an interchangeable basis and then, after assembly, the complete pump, compressor, steam turbine or gear is tested under operating conditions to make sure that performance guarantees are met and that the unit is mechanically perfect.

Following the test, the machine is taken down and the parts carefully scrutinized and gaged again, in order to detect any deviation from normal.



This practice and policy insures that the purchaser will in every instance receive a correctly built and perfectly operating machine.

De Laval STEAM TURBINE CO.
TRENTON 2, N.J.

MANUFACTURERS OF TURBINES... STEAM, HYDRAULIC; PUMPS... CENTRIFUGAL, CLOGLESS, ROTARY DISPLACEMENT, MOTOR-MOUNTED, MIXED-FLOW, PROPELLER; PRIMING SYSTEMS; CENTRIFUGAL BLOWERS and COMPRESSORS, GEARS... WORM, HELICAL, and FLEXIBLE COUPLINGS



FUSED QUARTZ

... AN UNUSUAL MATERIAL WITH
MANY INTRIGUING APPLICATIONS

GENERAL ELECTRIC FUSED QUARTZ—both translucent and clear types—has many unique properties. That's why it lends itself to so many laboratory and industrial applications . . . particularly in the fields of electricity, electronics, chemistry, and optics.

For example, its tensile and compression strengths are good; it has great resistance to scratching and weathering. Its almost perfect elasticity recommends it for galvanometer mirror suspensions.

THE EXTREMELY LOW COEFFICIENT of expansion of fused quartz (1/34 of copper, 1/17 of platinum, and 1/9 of tungsten) suggests a number of uses, such as: standard angles, standards of length, standards in the optical trade for flats, lenses and reflecting surfaces, and many other industrial applications.

ITS MELTING POINT is approximately 1756°C. It may be used continuously in the neighborhood of 1000°C and intermittently at temperatures as high as 1260°C.

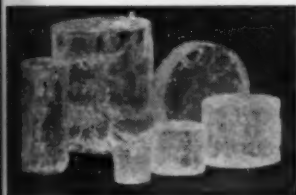
THE ELECTRICAL PROPERTIES of fused quartz are also unusual. Its high resistivity, low dielectric losses (particularly at high temperatures), and ability to withstand wide and sudden changes make it superior to glass and porcelain as an electrical insulator. Surface leakage is very small.

CHEMICALLY, it is inert except with alkaline reagents and certain acids. In fact it is not attacked by any acids, even when hot and concentrated, except hydrofluoric (at all temperatures) and phosphoric above 150°C.

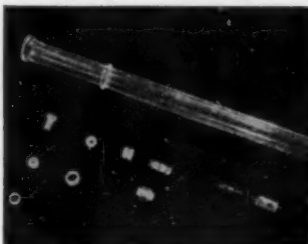
SEND TODAY for this free booklet, "Fused Quartz," which offers suggestions for new applications and contains a table of physical properties of this unusual material. Write the address below.



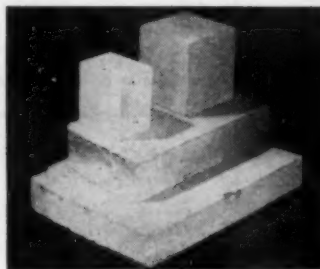
G-E FUSED QUARTZ IN THESE FORMS



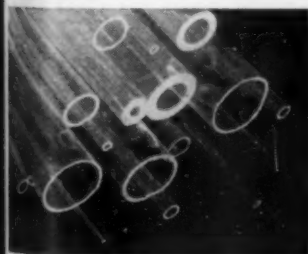
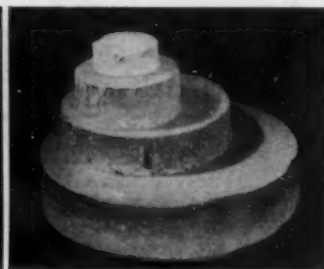
1 CLEAR FUSED QUARTZ INGOTS are normally cast in sizes up to a diameter of 10½" and in lengths up to 6" depending on the diameter of the ingot. Some of these many available sizes are shown here.



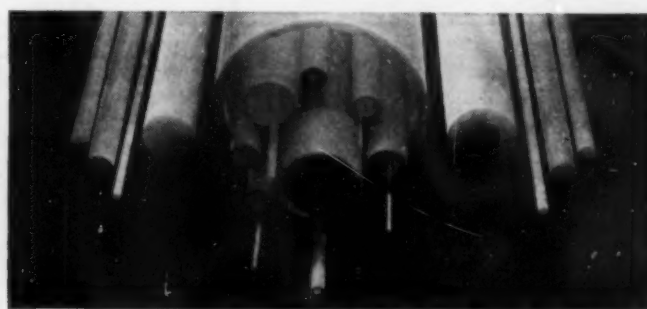
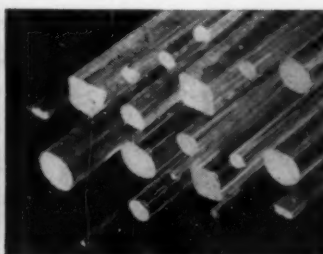
2 TYPICAL of the finishing available through G-E are these insulators for high frequency electronic tubes, finished to plus or minus .002.



3 ROUGH CUT SHAPES FROM CLEAR FUSED QUARTZ INGOTS—To the left are shown cubes and rectangles rough cut from various ingot sizes. To the right are shown cut discs ready for finishing to your specifications.



4 CLEAR FUSED QUARTZ TUBES AND RODS—Clear fused quartz can be drawn into tubing in dimensions ranging from capillary tubing up to a diameter of approximately one inch. Larger tubing may be hand-worked to diameters as large as 5 inches. Clear fused quartz rods are also drawn in many dimensions.



5 TRANSLUCENT FUSED QUARTZ RODS AND TUBES are drawn in a wide variety of dimensions and are available in a wide variety of diameters up to six inches.

THE BEST INVESTMENT IN THE WORLD IS IN THIS COUNTRY'S FUTURE — BUY WAR BONDS ★

GENERAL ELECTRIC

DIVISION NO. 84, NELA PARK, CLEVELAND 12, OHIO

Hear the General Electric radio programs: "The G-E All-Girl Orchestra," Sunday, 10 p.m., EWT, NBC; "The World Today," news every weekday, 6:45 p.m., EWT, CBS.

CHEMICAL & METALLURGICAL ENGINEERING • DECEMBER 1943 •

KNOCKING at the Chemist's Door

Thirteen new chemicals developed by Hooker Electrochemical Company are waiting for adventure. Consider their properties—send for research samples. It may be that one or more of these chemicals are what you have been seeking.

HIGHLY CHLORINATED PARAFFIN

Light colored, almost white, brittle resin, softening at about 100° C. and remaining very viscous at 140° C. Contains 76 to 78% Chlorine. This product is more stable than other chlorinated paraffins containing lesser amounts of Chlorine. Suggested uses: Resin for paints to withstand severe weather conditions.

CHLORPROPANE WAX

Molecular weight..... 320
Chemical formula..... $\text{CCl}_2\text{CCl}_2\text{CCl}_3$
Softening point..... 110 to 120° C.
Boiling range..... 210 to 270° C.
Color..... White crystalline wax
Odor..... Mild camphor-like

Insoluble in water, soluble in alcohol, ether and chlorinated solvents. Suggested uses: plasticizer; dielectric wax; pyrotechnic compositions; lubricant to withstand chemical attack.

HEXACHLORBENZENE

Molecular weight..... 284.7
Chemical formula..... C_6Cl_6
Melting point..... 230° C.
Color..... White to cream

Insoluble in water, soluble in carbon tetrachloride, monochlorobenzene, toluene. Suggested uses: pyrotechnic compositions; ingredient of water proofing and flame proofing compounds.

HEXACHLORBUTADIENE

Molecular weight..... 261
Chemical formula..... $\text{CCl}_2=\text{CCl}-\text{CCl}=\text{CCl}_2$
Melting point..... -26 to -25° C.
Boiling range..... 210 to 220° C.
Specific gravity..... 1.65 to 1.70 at 25°/15.5° C.
Color..... Water white

Insoluble in water; miscible with alcohol, ether, chlorinated organic solvents. Chemical properties: highly stable, is not easily hydrolyzed by water or mild alkalis. Suggested uses: solvent for rubber, synthetic rubber and other polymeric substances; high boiling non-flammable solvent; non-flammable heat transfer liquid; transformer fluid and hydraulic fluid.

HEXACHLORETHANE

Molecular weight..... 237
Chemical formula..... C_2Cl_6
Melting point..... 186° C.
Boiling point..... 186° C.
Color..... White crystals
Odor..... Mild camphor-like

Insoluble in water, soluble in alcohol and carbon tetrachloride. Suggested uses: pyrotechnic compositions; insecticide; plasticizer and chlorinating agent.

HEXACHLORPROPYLENE

(Perchlorpropylene)

Molecular weight..... 249
Chemical formula..... $\text{CCl}_2=\text{CCl}=\text{CCl}_2$
Boiling range..... 205 to 215° C.
Specific gravity..... 1.76 to 1.78 at 25°/15.5° C.
Color..... Water white
Odor..... Mild

Insoluble in water; miscible with alcohol, ether and chlorinated solvents. Suggested uses: solvent and plasticizer for rubber and other polymeric materials; non-flammable hydraulic fluid.

LAURYL CHLORIDE

(Dodecyl Chloride)

Molecular weight..... 213 (average)
Chemical formula..... $\text{C}_{12}\text{H}_{25}\text{Cl}$ (approximate)
Specific gravity..... 0.8618 at 25°/15.5° C.
Color..... Light yellow

Insoluble in water, soluble in organic solvents. Suggested uses: production of esters for plasticizers.

LAURYL MERCAPTAN

Molecular weight..... 211 (average)
Chemical formula..... $\text{C}_{12}\text{H}_{25}\text{SH}$ (approximate)
Specific gravity..... 0.8420 at 25°/15.5° C.
Boiling range..... 125 to 225° at 15 mm.
Color..... Water white

Insoluble in water, soluble in organic solvents. Suggested uses: catalyst in the production of copolymers such as Buna S.

METHYL PENTACHLOR STEARATE

Molecular weight..... 470 (approximate)
Chemical formula..... $\text{C}_{17}\text{H}_{33}\text{Cl}_5\text{COOCH}_3$ (approximate)
Specific gravity..... 1.200 at 25°/15.5° C.
Color..... Clear yellow to deep reddish brown

Insoluble in water, soluble in hydrocarbons. Suggested uses: plasticizer for polyvinyl chloride films to impart flexibility at low temperatures and to increase fire resistance; plasticizer for other film-forming materials.

PELARGONYL CHLORIDE

Molecular weight..... 176.5
Chemical formula..... $\text{CH}_3(\text{CH}_2)_7\text{COCl}$
Specific gravity..... 0.955 at 20°/15.5° C.
Boiling range..... 80–115° C. at 25 mm., 170–220° C. at 760 mm.
Color..... Colorless to light yellow

Is hydrolyzed by water; reacts with alcohols to produce esters, soluble in ether. Suggested uses: intermediate to produce esters for plasticizers; to produce the peroxide for polymerization catalyst.

POLYCHLORPROPANE LIQUID

Molecular weight..... 268.3 (average)
Chemical formula..... $\text{C}_3\text{H}_2\text{Cl}_6$ and C_3HCl_7
Boiling range..... 185° to 250° C.
Specific gravity..... 1.70 to 1.75 at 25°/15.5° C.
Color..... Water white

Insoluble in water; miscible with alcohol, ether and chlorinated solvents. Viscous liquid at temperatures below -50° C. Suggested uses: plasticizer; dielectric wax; pyrotechnic composition; lubricant to withstand chemical attack.

SODIUM TETRASULFIDE

Molecular weight..... 174
Chemical formula..... Na_2S_4
Specific gravity (40% solution)..... 1.335 at 20°/15.5° C.
Color..... Clear, deep red water solution

Suggested uses: soaking of hides and skins prior to unhairing; reduction organic nitro bodies; insecticide and fungicide for fruit tree spray; ore flotation reagent; reduction of cyanide plating baths; manufacture of sulfur dyes.

TETRA HYDRO FURFURYL OLEATE

Molecular weight..... 366.5
Chemical formula..... $\text{CH}_3(\text{CH}_2)_7\text{CH}(\text{CH}_2)_7\text{COOCH}_2\text{C}_4\text{H}_7$
Specific gravity..... 0.926 at 15.5°/15.5° C.
Refractive index..... 1.4640
Color..... Yellow to light brown

Insoluble in water; soluble in alcohols, esters, ketones, hydrocarbons, and chlorinated solvents. Suggested uses: plasticizer for polyvinyl chloride films to impart flexibility at low temperatures; plasticizer for other film-forming materials.

KEEP ON
BUYING
WAR BONDS

If additional information is desired, write our Dept. M12

HOOKEE ELECTROCHEMICAL COMPANY

NIAGARA FALLS, N. Y.

New York, N. Y.

Tacoma, Wash.

Wilmington, Calif.

HOOKEE CHEMICALS





AN APPRECIATION, and a pertinent message—

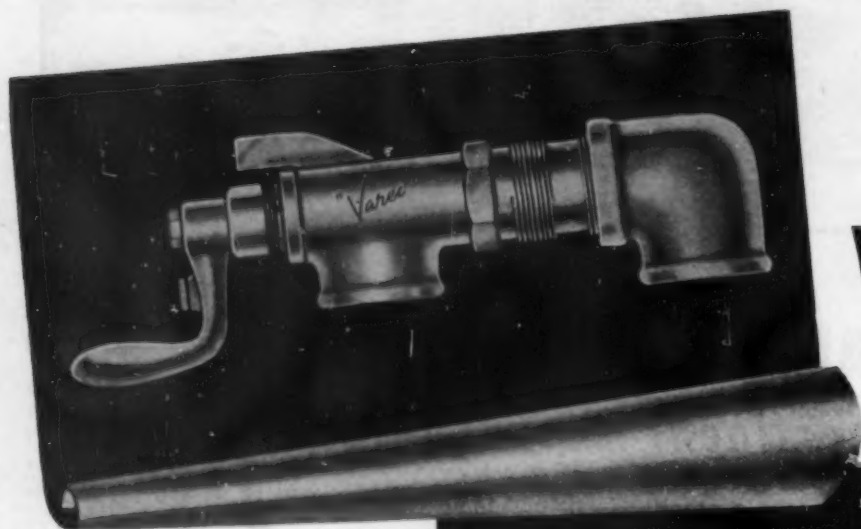
To remind our many friends and customers that we look forward to serving you as eagerly in this coming year as in the past . . . to thank you for your valued patronage, and . . .

To remind you that our 29 years' experience in the fabrication of steel plate, our knowledge of the physical and metallurgical chemistry involved in plate work, as well as our staff of engineering talent . . . all are still at your service.

To remind you that Downingtown's varied interests include the fabrication of *steel and alloy plate* into vessels for storage of propane, acids, ammonia, etc.; sulphonators, absorber columns, lime filter, stabilizer columns, accumulator tanks, acid settler tanks, vacuum towers, fractionating columns, air receivers, sterilizers, stills, heaters, coolers, condensers. Attention is called to Downingtown's "Shellfin" Heat Exchanger.

DOWNINGTOWN IRON WORKS, DOWNINGTOWN, PA.
WELDED AND RIVETED PRODUCTS

Here's the "Inside Story" of the



"VAREC"

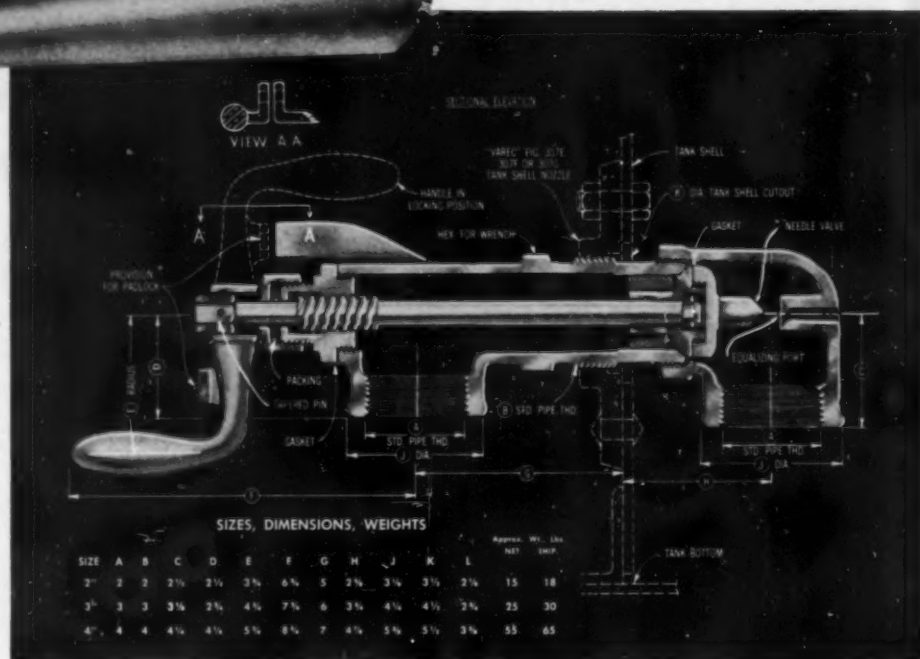
ANTI-FREEZE

WATER DRAW-OFF VALVE

"VAREC" approved PRODUCTS

Flame Arresters, Pressure Relief Valves, Breather Valves, Conservation Vent Valves, Vent Valves, Vapor Recovery Systems, Pressure and Vacuum Relief Valves, Emergency Check Valves, Temperature Bombs, Explosion Relief Valves, Anti-Freeze Water Draw-Off Valves, Check Valves, Pressure Regulators, Automatic Tank Gauges, Swing Line Equipment, Tank Winches, Tank Sheaves, Gauge Covers, Manhole Covers, Sediment Traps, Drip Traps, Manometers, Drain Elbows, Hillside Flanges, Waste Gas Burners, Pressure and Vacuum Marine Valves, Other Tank Appurtenances.

"VAREC" Tank Equipment, Gas Control and Safety Devices Catalog and Handbook P-7 fully describes all "VAREC" Products in detail with flow charts, diagrams, photographs, and engineering data. A copy is a valuable asset to the engineer's library. It is yours for the asking.



To simplify the troublesome procedure of removing excess water from the bottom of the tank, "VAREC" engineers have perfected the approved Anti-Freeze Water Draw-off Valve. The danger of freezing is eliminated by use of a needle valve. When the main valve is opened, the needle valve closes the equalizing port so that bottom water only is withdrawn. When draining operation is completed and main valve is closed, equalizing port is automatically opened. This permits the tank product to displace any water remaining in the valve.

Travel of valve is attained by Acme threads. Inner valve does not rotate insuring perfect alignment, and preventing scoring of the seat or inner valve. Valve can be supplied without needle valve and equalizing port for tropical service.

The unit is adaptable to any size or type of tank and is available with a 60° or 90° elbow. Manufactured of all bronze as standard, it can be furnished in other materials upon special order. Provision is made for padlocking.

The "Varec" Engineering Department and Laboratory are always at your command to collaborate.



THE VAPOR RECOVERY SYSTEMS COMPANY

Consultants, Designers, and Manufacturers of Gas Control and Tank Equipment
COMPTON • CALIFORNIA

New York City • New Orleans, La. • Houston, Tex. • Tulsa, Okla.

Agencies Everywhere

MISCO Stainless Steel PIPE and TUBES

Centrifugally Cast — 2½" to 20" O. D.

Corrosion Resisting — Heat Resisting

FLANGED - THREADED - PLAIN

Misco centrifugally cast stainless steel pipe and tubes are made in practically any stainless alloy required by the chemical process industries.

Made by the centrifugal casting process, Misco stainless steel pipe and tubes are smooth, accurate and They offer exceptional resistance to high pressure, abrasion and corrosion. Consult Misco requirements for stainless steel pipe and

Centrifugally Cast Tubes are recommended for
... Sleeves ... Valve Seats ... Shafting ...
... Bushings ... Rings of all kinds
... Conveyor Rolls ... Chemical Pipe
Applications requiring cylindrical cast-

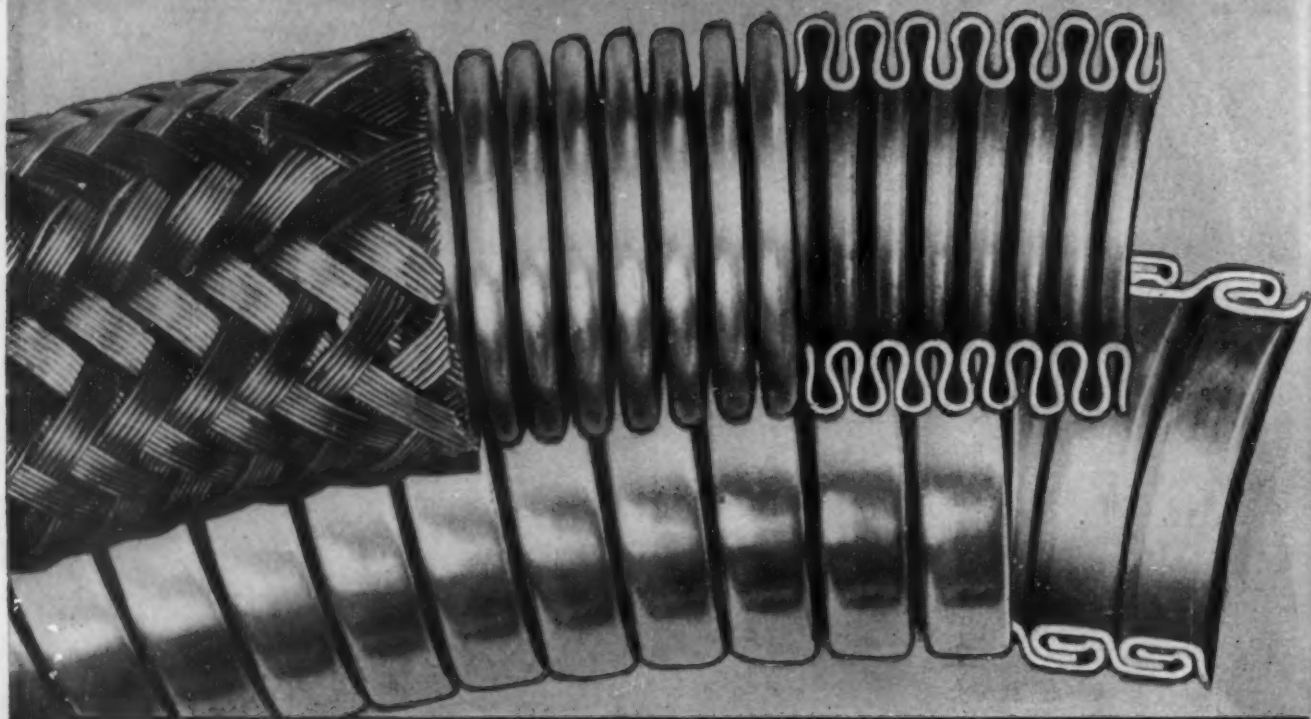
WAR BONDS ★



COMPANY 1999 Guoin Street **DETROIT 7, MICHIGAN**

Pioneer Producers of Chromium-Nickel Alloy Castings

INDUSTRY'S MOST "Flexible" WEAPONS



OUTSTANDING among the "weapons" that are winning a production war in America's industrial plants are American Flexible Metal Hose and Tubing . . . products which serve in almost every major industry.

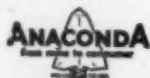
And by "Flexible" we mean just that. Flexible in use, flexible in construction and serviceable for a thousand duties. There's no substitute for metal in its ability to convey oil, steam, hot water, gas, solvents, chips, dust, etc . . . Other materials will perform *some* of these duties . . . other materials *are* flexible. But metal alone has the strength for endurance, the characteristics to withstand heat and cold, abrasion and vibration. Its Flexibility . . . because of American's construction methods . . . is available in any degree required and, in the case of Seamless, there are records of millions of flexings, without breaking.

Shown in the top illustration is American "Seamless," the bronze tubing without welds, joints, laps, seams or packing . . . as leakproof as the rigid seamless tube from which it is corrugated. Its resistance to pressure is increased by an armor of one or more wire braids.

American Interlocked hose, also pictured, is asbestos packed for heavy service . . . bronze for steam and steel for oil. Also in light weight and unpacked for air, gases and light dry materials.

When the changeover to peacetime production takes place, you will find American products on the production lines in every conceivable use. Plan now . . . ask for descriptive bulletins on "Seamless" or any other type of flexible hose or tubing with American's dependable metal construction.

42304



American Metal Hose

AMERICAN METAL HOSE BRANCH OF THE AMERICAN BRASS COMPANY • General Offices: Waterbury 88, Conn.
Subsidiary of Anaconda Copper Mining Company • In Canada: ANACONDA AMERICAN BRASS LTD., New Toronto, Ontario

J-M Rotproof, Rustproof Corrugated Transite SPEEDS VITAL CONSTRUCTION, LASTS FOR YEARS AND YEARS!

THOSE big, tough J-M Transite Sheets are made of asbestos and cement, compressed under great pressure and corrugated to give them extra strength and usefulness. They cannot burn, cannot rot or rust. They never need painting or other preservative treatment. And they'll last for years and years.

These qualities make J-M Corrugated Asbestos Transite ideal for wartime and post-war construction. They can be quickly set in position over light framing. And, if the time comes when the structure is no longer needed, they

can be salvaged and reused with a minimum of loss.

J-M Transite is especially useful for chemical plants because of the high resistance to acids and to gaseous fumes, and also because it can withstand severe temperatures.

Send for illustrated brochure, TR-12A. Johns-Manville, 22 E. 40th St., New York 16, N. Y.

SOME WARTIME USES OF J-M CORRUGATED TRANSITE

MUNITIONS PLANTS	REFINERIES
BOMBER PLANTS	GAS PLANTS
CHEMICAL PLANTS	MAGAZINE
RAILROAD BUILDINGS	WAREHOUSES
TROPICAL BASES	ORDNANCE DEPOTS
NAVAL BASES	MINE BUILDINGS
AIRCRAFT HANGARS	

J-M Corrugated Transite and J-M Asbestos Built-Up Roofing are making an important contribution to the protection of our industrial plants in wartime.



JOHNS-MANVILLE
Asbestos
CORRUGATED TRANSITE

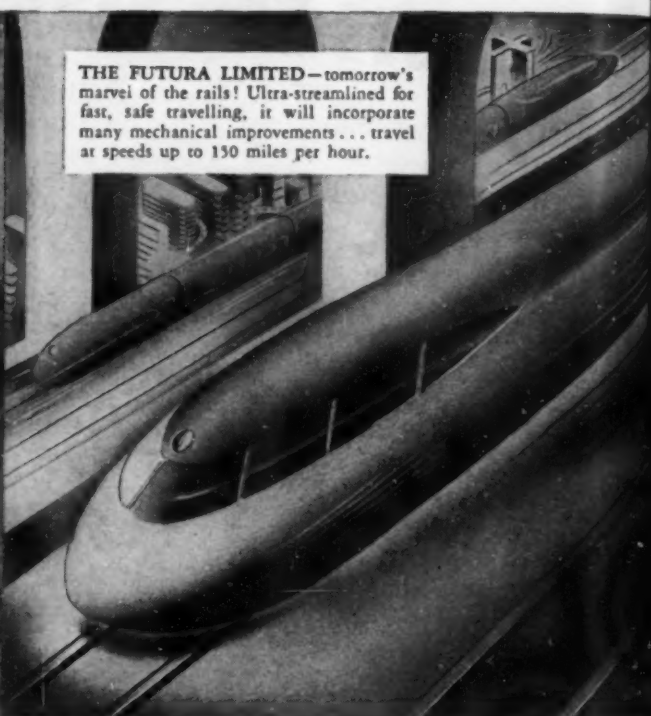
SOLVAY*

...KEYED TO TODAY AND TOMORROW!

MOBILE FORT—battering General Sherman tank! Armored bulldozer with a deadly firing power and ponderous force that mows 'em down and opens "holes" for the infantry.



THE FUTURA LIMITED—tomorrow's marvel of the rails! Ultra-streamlined for fast, safe travelling, it will incorporate many mechanical improvements... travel at speeds up to 150 miles per hour.



Today... armored carriers of destruction such as this General Sherman tank are smashing enemy resistance. From the fabrication of their steel to the machining of their parts, Solvay alkalis are used! Soda Ash, Caustic Soda and many important related products are supplied from 3 great strategically located plants. Established in 1881, Solvay is America's largest producer of high quality alkalis.

Tomorrow... tanks of war will become railway tank cars and ultra-streamlined carriers transporting the achievement of tomorrow. Solvay's research will discover new, interesting uses for its products that will better serve the nation. Solvay's vast resources and background experience will be devoted to producing the best of alkalis. As always, Solvay will serve industry with its "know-how" ability and technical service.

SOLVAY

TRADE MARK REG. U. S. PAT. OFF.

* The Solvay Process Company employs salt, limestone and ammonia to make Soda Ash, from which basic material Caustic Soda and other alkalis are derived.



SODA ASH • CAUSTIC SODA

AMMONIUM CHLORIDE • CAUSTIC POTASH

MODIFIED SODAS • AMMONIUM BICARBONATE

SODIUM NITRITE • PARA-DICHLOROBENZENE

CALCIUM CHLORIDE • CHLORINE • SALT

POTASSIUM CARBONATE

SOLVAY SALES CORPORATION

*Alkalies and Chemical Products Manufactured by
The Solvay Process Company*

40 RECTOR STREET NEW YORK 6, N. Y.

BRANCH SALES OFFICES:

Boston • Charlotte • Chicago • Cincinnati • Cleveland • Denver
New Orleans • New York • Philadelphia • Pittsburgh • St. Louis • Syracuse

AUTOMATIC, SUPERSENSITIVE DENSITY CONTROL



the New Dorrc Hydrosizer

A new hydraulic classifier, the Dorrc Hydrosizer provides fully automatic control of a sensitivity never before approached in such a unit. It produces a more accurately sized and better concentrated series of sands, and has possibilities of application beyond the present scope of hydraulic classification.

New and unique design features are responsible for the superior performance of the new Hydrosizer . . . already proven by a number of installations. Supersensitive control equipment delivers a more uniformly graded product . . . and once set by the operator requires no further attention barring major changes in feed characteristics.

The Dorrc Hydrosizer represents the last word in hydraulic classification . . . applicable wherever 4 mesh or finer materials of varying specific gravities or particle sizes are to be graded. Check the advantages at the right—and for complete information write to our nearest office.

ADVANTAGES OF THE DORRC HYDROSIZER

1. **Simple Control**—changes in hydrostatic tube clearly visible—control equipment close by and easy to set.
2. **Fully Automatic**—no operating attention needed except where major changes in feed characteristics occur.
3. **More Accurate Sizing** due to elimination of lag in changing valve opening.
4. **Preliminary Sorting** by feed compartment preceding #1 pocket.
5. **Easy Cleanout** due to high pressure water connection beneath each constriction plate.
6. **No build-up of particles** on constriction plate is possible, due to new design.



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DORR

RESEARCH ENGINEERING EQUIPMENT

ADDRESS ALL INQUIRIES TO OUR NEAREST OFFICE

CHEMICAL & METALLURGICAL ENGINEERING • DECEMBER 1943 •

Silenced...the sparks in Sparks' Ears

Yes... sparks had to be banished from Sparks' ears, for today radio communication is by voice. Voice communication from crew member to crew member. From pilot to pilot. From squadron leader to squadron leader. From Air General to every one of 9,000 airmen aloft in a 1,000 plane formation.

- Spark signals from the high tension ignition systems of aircraft would completely blot out radio voices. The ignition cables must be completely shielded—electrically and mechanically. Titeflex flexible metallic tubing is doing that job.

- But, what has this to do with *your* problem?

- *You may be responsible* for a vastly different product. But consider this Titeflex aircraft application as a performance test of flexible metal tubing... think of it in terms of your own flexible connection problems.

- Titeflex in aircraft performs on the front of the engine directly in a wind stream of over 300 miles per hour. It vibrates in mid-air under the full military power of a 2000 hp engine running at top speed. Rain lashes it in torrents—at tornado force.


- Yet, Titeflex remains *tight* enough to shield an electrical current of 10,000 volts. And all this at sub-stratosphere temperatures of 50° below, outside the tubing. And 300° above, at the spark plug end.

- Could any use-test be more convincing—whether your problem be the conveyance of oil, gasoline, acid, gas, water, steam, or electricity?

- Ask our application engineers to tell you more about Titeflex not only for wartime applications but also for postwar use.

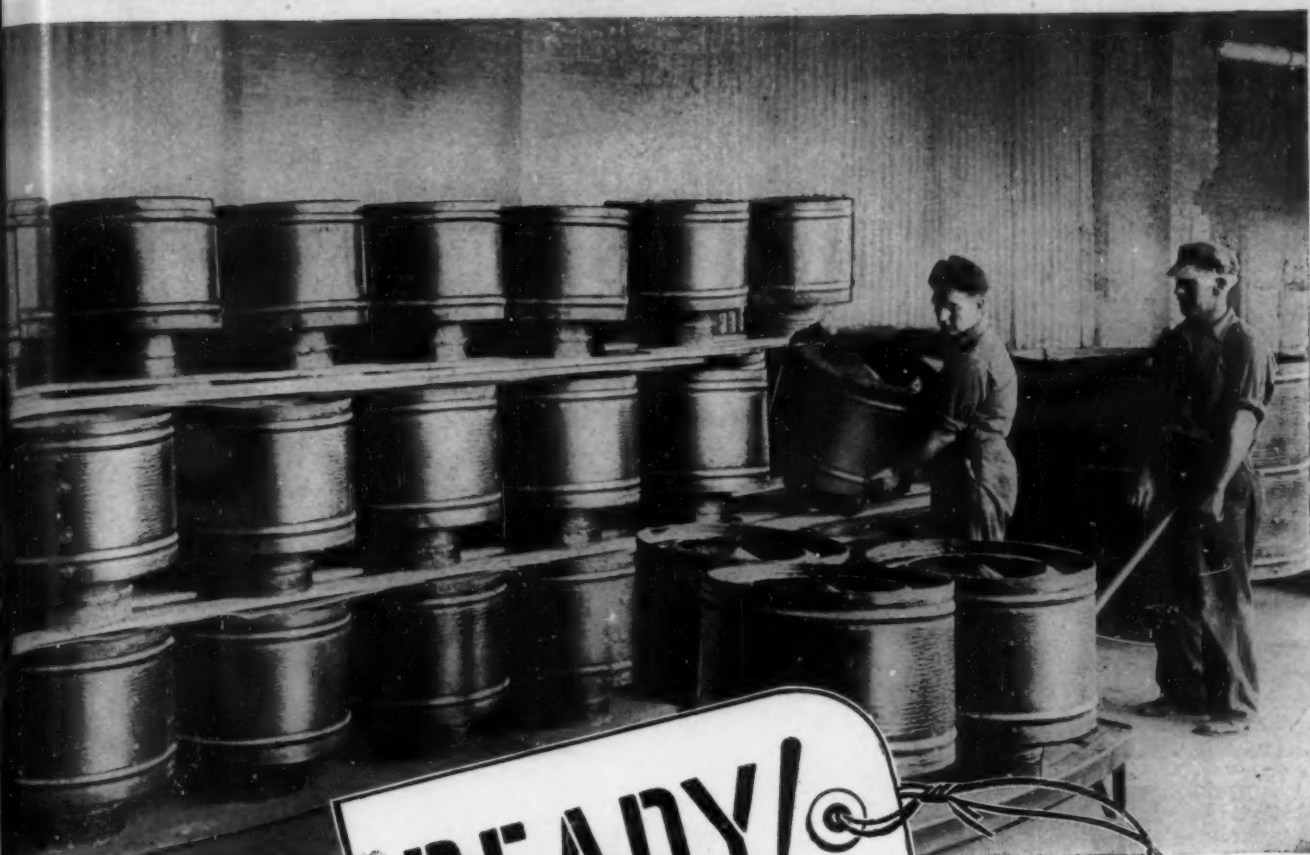
TITEFLEX METAL HOSE COMPANY
52 Frelinghuysen Ave., Newark, N.J.





Titeflex

FLEXIBLE...ALL-METAL TUBING!



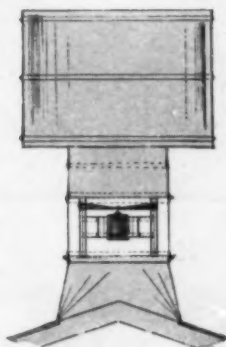
Stocks of

Asbo VENTILATORS can be loaded for shipment in a few hours

It is a mistake to think that construction materials are not obtainable, or that needful use of them is banned.

Let us tell you what we know about Government restrictions, which probably will not interfere with the job that you have in mind, for the preservation or better operation of your plant. Learn about the long service life and the practical economy of asbestos-protected metal roofing, siding, and ventilators. Remember that 80% of what you might invest in such permanent assets, may be otherwise taken from you as "excess profits."

What is your requirement? Send us rough drawings or necessary specifications, giving roof pitch, etc. We will mail proposals, with full information, or will send a representative if desired.

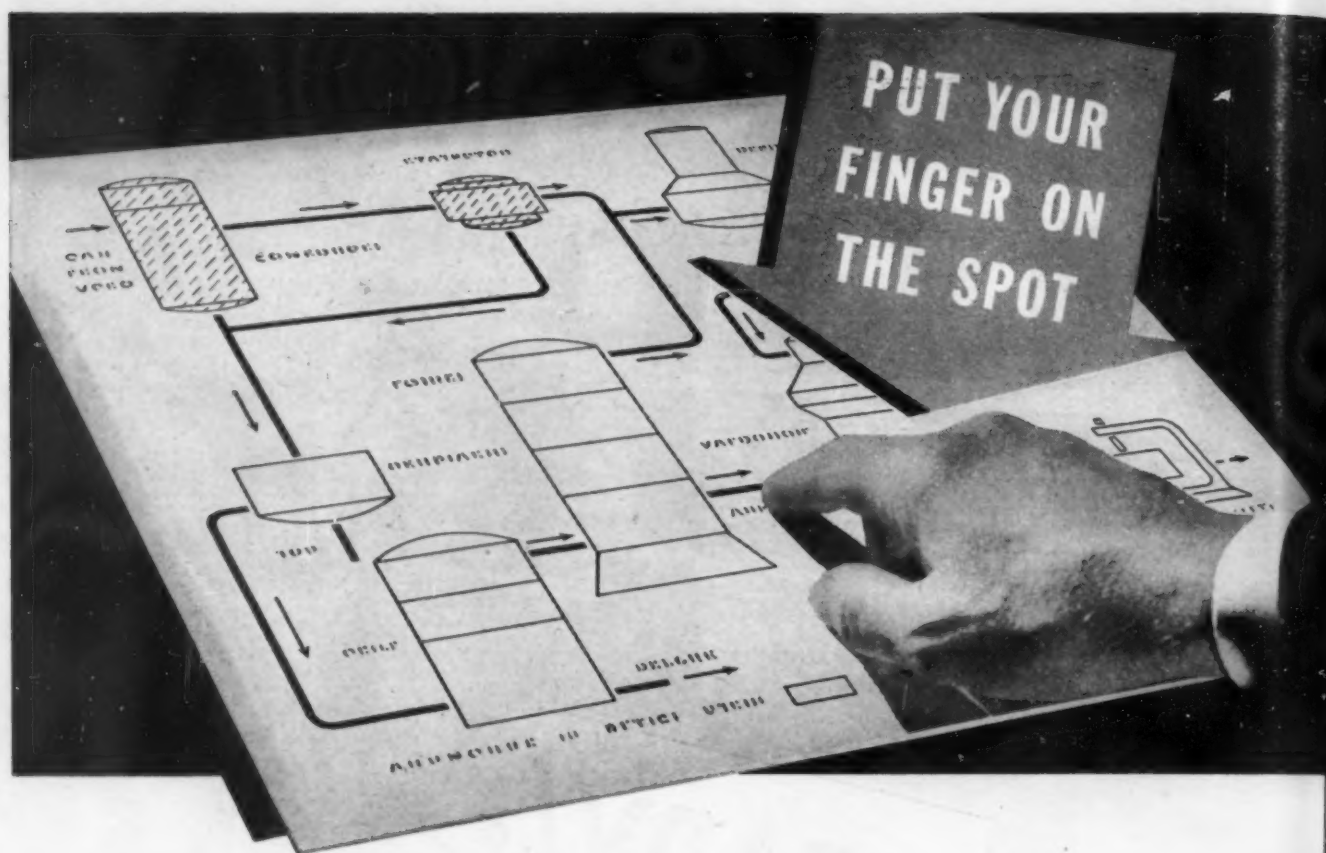


Other gravity-type or fan-driven Asbo Ventilators can be shipped from stock or fabricated speedily from materials on hand. Available engineering service and adequate shop facilities. Installation by thoroughly trained crews assured without delay. Write or wire.

AMERICAN STEEL BAND COMPANY

PITTSBURGH, PA. • PLANT, CARNEGIE, PA. • ESTABLISHED 1891

CHEMICAL & METALLURGICAL ENGINEERING • DECEMBER 1943 •



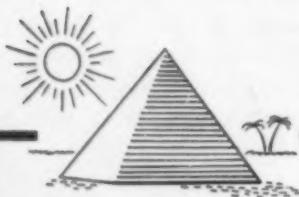
where DRYing will help

Visualize here, in place of this flow chart, a diagram of your own processes. Then ask yourself, "Where will efficient DRYing of the gases or liquids we're working with help us improve and speed up production?"—"Will control of moisture in the atmosphere make us independent of outside weather conditions?"—"Will the control of the moisture content of raw materials improve our processing?"

You decide *where* you can use DRYing to advantage. Then let Lectrodryer engineers help you determine *how* to do that job.

No need for your men to concern themselves with such unfamiliar tasks. Lectrodryer engineers have devoted years to the solution of DRYing problems for dozens of industries, working with various organic liquids, gases and air. In many cases, a standard Lectrodryer will handle the job. If not, a special machine is designed and built.

You'll save time and money if you call on Lectrodryer for DRYing help. Write PITTSBURGH LECTRODRYER CORPORATION, 303 32nd Street, Pittsburgh, Pennsylvania.



LECTRODRYERS DRY WITH ACTIVATED ALUMINAS

PITTSBURGH

LECTRODRYER

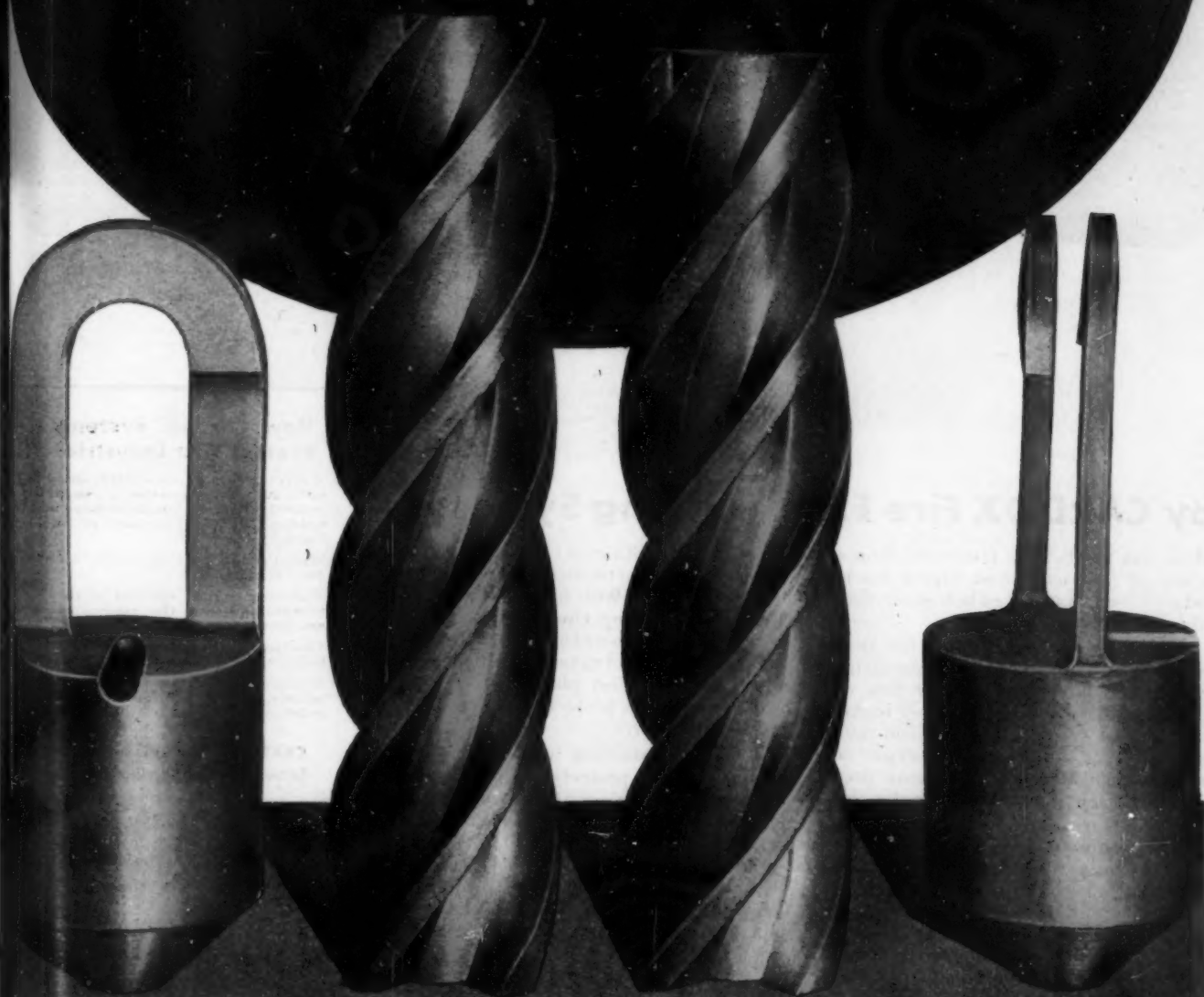
CORPORATION

Reg. U.S. Pat. Off.

Intricate Lead Work!

The center pieces are spirals for spray nozzles, formed from chemical lead to exact specifications. They are not castings but rather machined products. The objects on each end are extruded, machined lead electrode weights, employed in Cottrell Precipitators.

The American Smelting and Refining Company and its subsidiary, the Andrews Lead Construction Corporation, is prepared to fabricate and erect apparatus employing thousands of tons of lead. Remember too, that their facilities can efficiently produce the most intricate lead work.



AMERICAN SMELTING and REFINING COMPANY

LEAD PRODUCTS DIVISION



120 BROADWAY, NEW YORK

**WAR-WINNING
PRODUCTION
DEMANDS**

This **FIRE PROTECTION**

by CARDOX Fire Extinguishing Systems

More war goods from fewer man-hours is one of America's most urgent needs today! Every hour saved here is another step toward victory.

One major fire—or a small fire that results in crippling damage by the extinguishing medium—can cut the flow of vital war goods to a trickle over night. Such fires may halt or slow down production on a dozen different types of essential fighting tools . . . waste precious man-hours and critical materials.

Cardox Fire Extinguishing Systems provide distinctive advantages in protecting production against these war-prolonging fires. They smother the fire and "cool out" combustibles through timed mass discharges of pounds or tons of CO₂ . . . with no damage by the extinguishing medium. Consequently, when fire strikes, men and machines are usually back in production quickly. Losses of vital materials are reduced to a minimum.

Industries guarding War-Winning Production with engineered Cardox Fire Extinguishing Systems include leading manufacturers of Airplanes, Airplane Parts, Armor Plate, Aviation Carburetors, Aviation Engines, Cold Strip Steel, Electric Power, Engine Parts, Forgings, Motor Fuel, Plastics, Processed Fabric, Rubber Products, Solvents, Tanks, Tank Engines.

Today, the facilities of Cardox are concentrated on two activities: (1) Providing fire protection for War-Winning Production; (2) Applying the technological knowledge gained here to help industrial, municipal, state and national fire fighting organizations perfect plans to increase the efficiency of fire protection both today and after the war.

If more information would help—in solving your fire protection problems of today or tomorrow—write on your company letterhead for Bulletin 17123.



CARDOX CORPORATION **BELL BUILDING • CHICAGO 1, ILLINOIS**

District Offices in New York • Washington
Detroit • Cleveland • Atlanta • Pittsburgh
San Francisco • Los Angeles • Seattle

How Cardox Systems Protect War Industries

- Timed discharges, as needed, through built-in piping systems . . . supplied instantly from a single storage unit holding tons (if required) of liquid Cardox CO₂.
- Mass discharge of Cardox CO₂ "knocks out" fire, by . . .
- Reducing oxygen content of the atmosphere below the concentration necessary for combustion, and . . .
- Cooling combustibles and fire zone below ignition temperature . . .
- Extinguishing fire quickly and completely without damage from extinguishing medium.

CARDOX—CO₂ Systems with Enhanced Fire Extinguishing Performance

- A. Uniformity of CO₂ characteristics.
- B. Extinguishing medium with uniformly greater cooling effect.
- C. Accurate projection of CO₂ through greater distances.
- D. Timed discharges, as needed, through built-in piping systems . . . supplied quickly from a single tank holding tons of liquid Cardox CO₂.

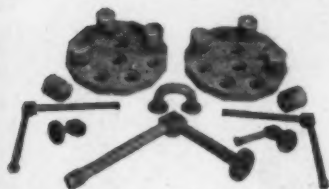
MASS DISCHARGE OF CO₂ ENHANCED COOLING EFFECT CENTRAL STORAGE UNIT AMPLE CO₂ RESERVE ENGINEERED SYSTEMS MANUAL OR AUTOMATIC CONTROL

CARDOX

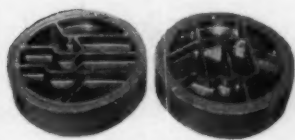
NON-DAMAGING FIRE EXTINGUISHING SYSTEMS



Porous Carbon Diffuser



Pipe, Fittings, Bubble Caps and Trays



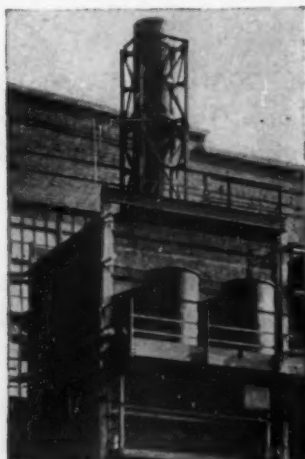
Headers for heat exchanger



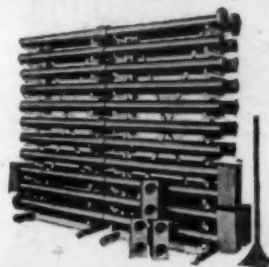
Sections of segmental type reaction tower



Tube and shell heat exchange unit



47' high all-carbon electrostatic precipitator



Return bend cooling coil



For Continuous and Reliable Service

NATIONAL AND KARBATE CARBON AND GRAPHITE PRODUCTS

TRADE-MARK TRADE-MARK

are extremely versatile and readily adapted to the construction of equipment of conventional design as well as special equipment of new design.

Outstanding performance and economies, along with simplification of design, are made possible by the following unique and advantageous combination of physical and chemical properties offered by these materials.

Resistance to severe thermal shock / No deformation at high temperatures / Not wet by molten metals — no sticking / Mechanical strength maintained at high temperatures / No reaction with most acids, alkalis and solvents — no contamination / High rate of heat transfer (Graphite and graphite base "Karbate" products) / Low rate of heat transfer (Carbon and carbon base "Karbate" products) / Low thermal expansion / Good electrical conductivity / Self-lubricating / Available in impervious grades / Available in highly permeable (porous carbon and graphite) grades / Easily machined and fabricated.

Practically any design can be machined or fabricated from available stock in the form of beams, blocks, slabs, brick, plates, round and rectangular rods, tubes and cylinders, pipe, fittings, valves, tower sections and tower accessories.

Special shapes or forms can be molded or extruded when quantity justifies.

The illustrations show only a few of the many diversified applications of these products.

Write for descriptive literature

NATIONAL CARBON COMPANY, INC.

Unit of Union Carbide and Carbon Corporation



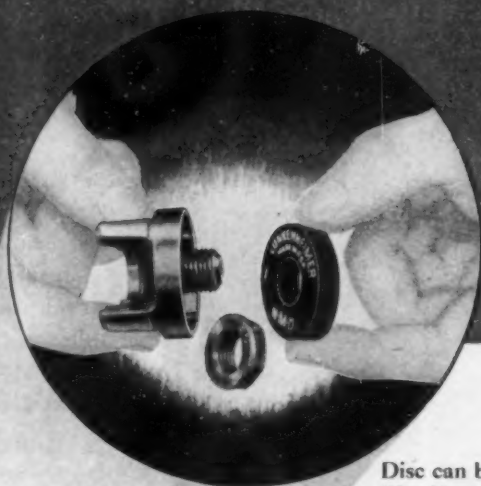
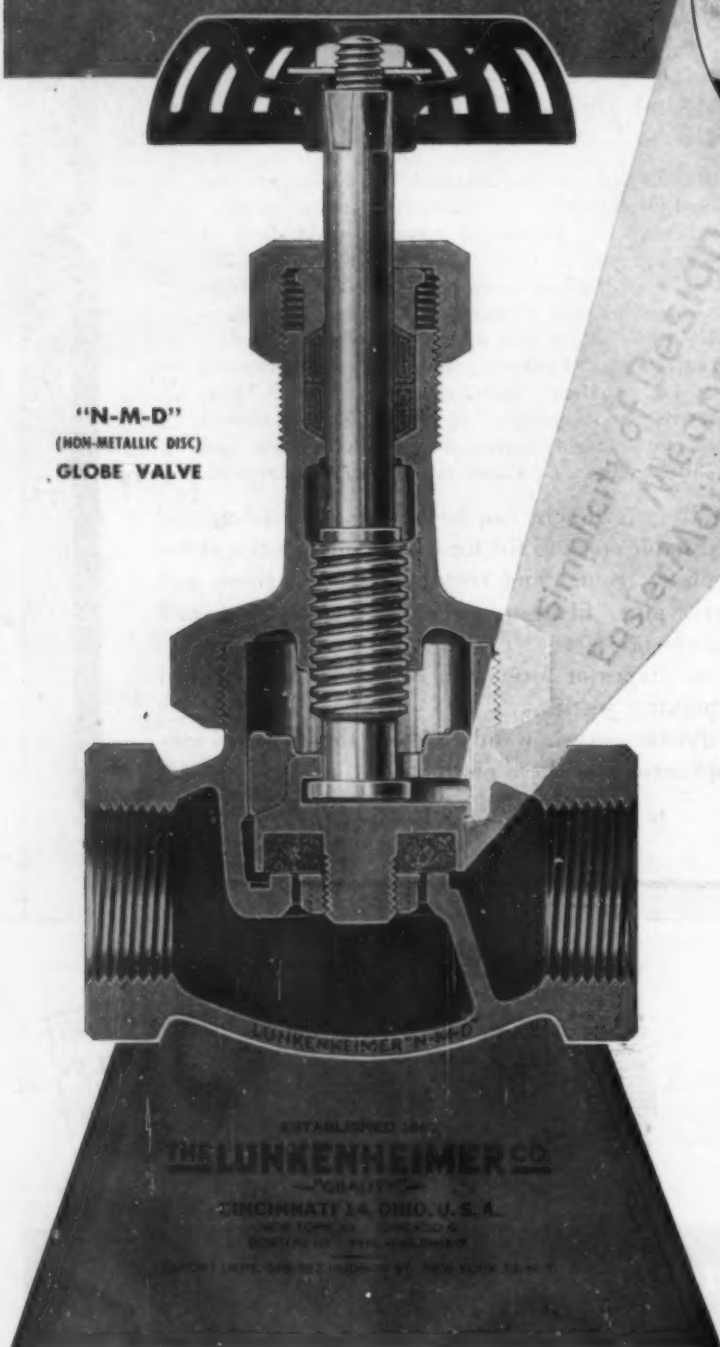
CARBON PRODUCTS DIVISION, CLEVELAND, OHIO

General Offices: 30 East 42nd St., New York, N. Y.

Branch Sales Offices: New York - Pittsburgh - Chicago - St. Louis - San Francisco

Here's how to make your present Valves ...LAST LONGER ...SERVE BETTER

"N-M-D"
(NON-METALLIC DISC)
GLOBE VALVE



Disc can be renewed in a jiffy. Simply unscrew locknut from disc holder, remove old disc, insert new one and reassemble. Or better still, keep on hand some spare disc holders complete with discs—slip a disc holder and a new disc on the stem and remove the old disc later.

*Simplicity of Design
Means
Easier Maintenance*

● Experience shows that even the best valves last longer and serve better if given periodic inspection ... and repairs when necessary.

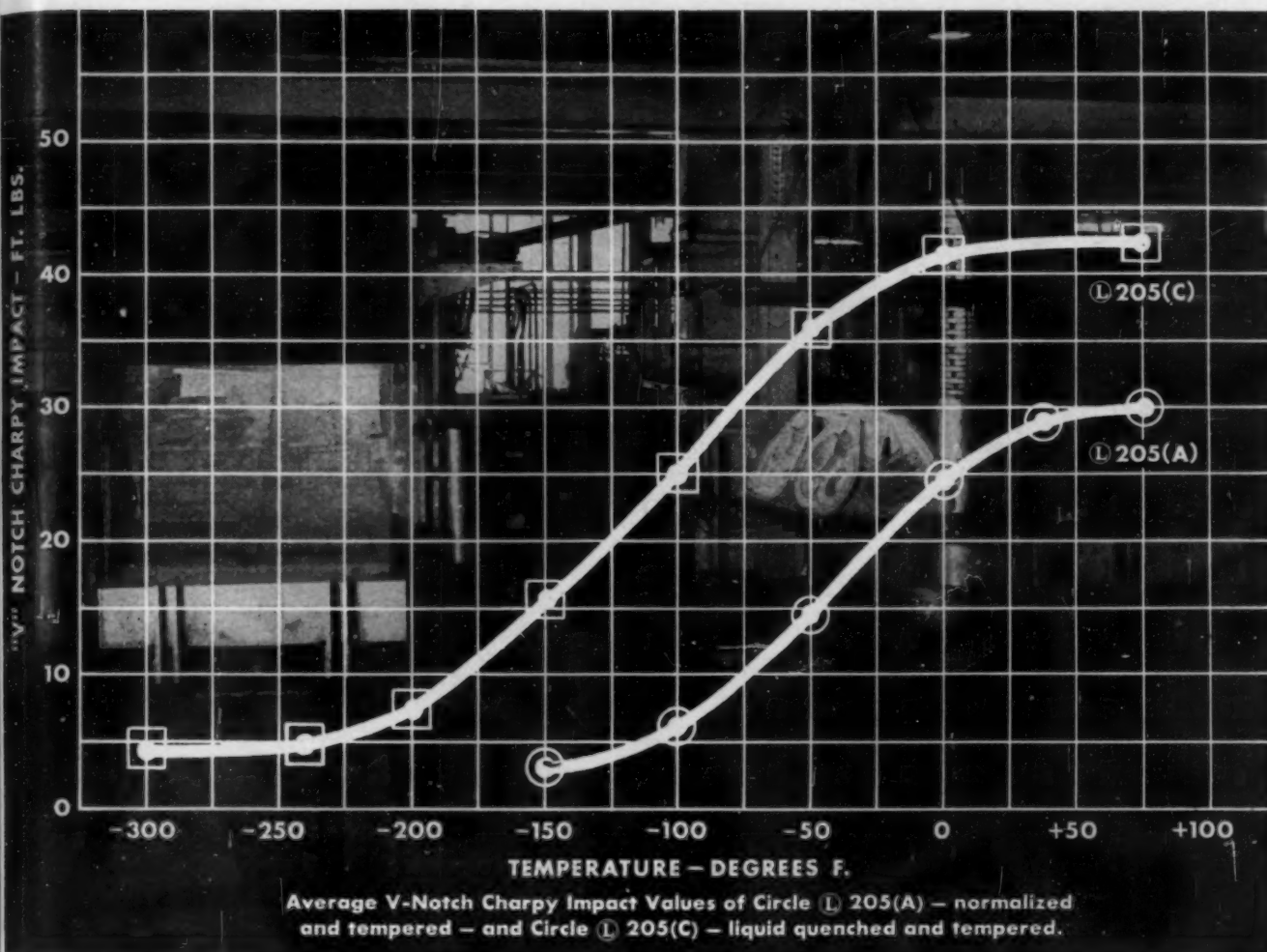
Today when new valves and even repair parts are scarce and require high priorities, it is more essential than ever to take good care of the valves you now have in service.

The Lunkenheim "N-M-D" Valve illustrated is typical of the simple, rugged, easy-to-maintain construction that distinguishes Lunkenheim design practice.

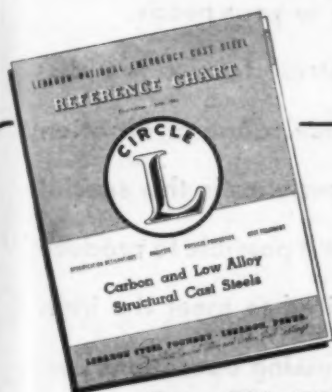
Thus maintenance men working with these valves find them easier to keep fit and on the job... find that Lunkenheim valves will last longer and serve better with less time out for repairs.

Use the facilities of Lunkenheim distributors. They'll help you get what you need.

BRONZE, IRON, STEEL AND CORROSION RESISTANT ALLOY VALVES, 125 TO 2500 LB. S.P.;
BOILER MOUNTINGS, LUBRICATING DEVICES, AIRCRAFT FITTINGS. ASK FOR CATALOG 78



There Are EMERGENCY Steels for Sub-Zero Service



**Open This FREE
File Size Chart and The
Facts Lie Before You!**

You needn't "dig" for information... needn't lose valuable time... when you possess this free reference chart on Circle L National Emergency Cast Steels. A single spread shows comparative specification designations, nominal analyses, minimum physical properties and heat treatment. Every executive, engineer and metallurgist concerned with the use or purchase of alloy steel castings should have a copy. Write for yours today.


CRITICAL, restricted alloys are no longer "musts" for castings that go into sub-zero installations. Two Circle L EMERGENCY Steels—205 (A) and 205 (C)—give excellent service at low temperatures. These low alloy, high strength structural steels are specially heat treated by Lebanon to obtain characteristics—for low-temperature service—similar to NE8630.

Circle L 205 (A) is *normalized* and drawn. This alloy is thoroughly dependable at all Arctic and sub-Arctic

temperatures... at all temperatures encountered in the stratosphere.

Where service is severe and temperatures extremely low, specify Circle L 205 (C). *Liquid quenched* and drawn, this steel gains added strength from the heat treatment. The physical properties of Circle L 205 (C) meet any present day commercial requirements.

Standardize on these Circle L Steels and obtain castings with outstanding integrity at low temperatures... yet save critical alloys.

LEBANON STEEL FOUNDRY  **LEBANON, PENNA.**

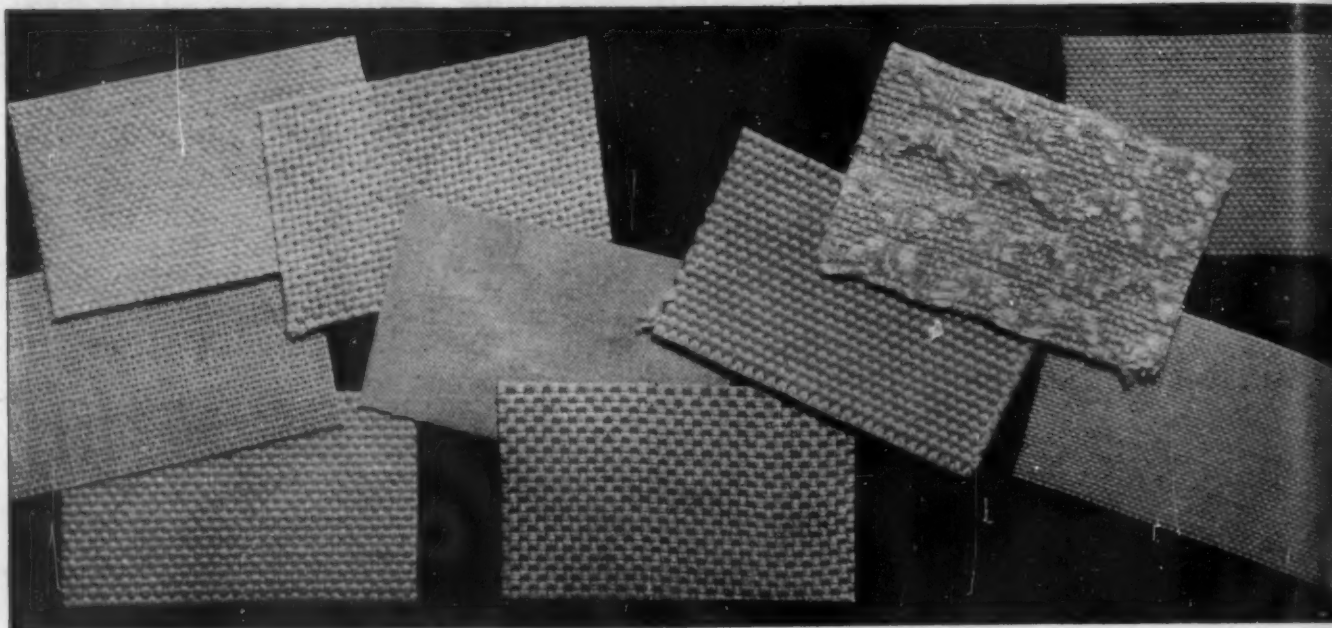
ORIGINAL AMERICAN LICENSEE GEORGE FISCHER (SWISS CHAMOTTE) METHOD

LEBANON



Stainless and Special Alloy
STEEL CASTINGS

Fabrics for the Plastics of Tomorrow



We manufacture and distribute over 25,000 different fabrics—many of which are of interest to plastic manufacturers. Our knowledge of fabrics made of cotton and other fibres and their application to industrial processes has enabled us to help solve many a tough production problem.

We represent twenty mills and maintain the finest textile research laboratories. You

will find us prepared to work with you toward the selection or development of fabrics most suitable to your needs.

Among the industrial fabrics we distribute are a very wide range of filtration fabrics. Our long experience in this special class of fabrics makes it possible to produce the varied line required to meet the individual needs of processing operations carried out under widely varied conditions.

WELLINGTON SEARS COMPANY

65 Worth Street, New York 13, N. Y.

BUY MORE WAR BONDS

These tiny cells of ageless glass make B.T.U.'s behave!

Photograph is enlarged approximately 10 times.

**PC FOAMGLAS, UNIQUE NEW
INSULATING MATERIAL, STAYS NEW
... NEVER DETERIORATES WITH AGE**

FOAMGLAS insulation has that rare quality which so many insulating materials lack . . . *permanence*. It's moisture-proof. Vapor-proof. Unaffected by acid atmospheres. Non-combustible. Vermin-proof. Rigid and sturdy of structure. Foamglas consists of thousands of tiny cells of glass . . . and partakes of the agelessness of glass. That's why it retains its original insulating value year after year in service. And why it can save you so much in maintenance and replacement costs.

You'll find it ideal for furnace and oven back-up. For insulating towers, stills and other processing equipment. Equally valuable for insulating outdoor storage tanks. In fact, for any application where close control of temperature is required, where processing temperatures do not exceed 1000°F., and where sudden thermal shock isn't likely, you can't beat PC Foamglas!

Foamglas is easy to apply, easy to cut and handle on the job. Weighs only 0.9 lb. per board foot. Standard

size of 12" x 18", thicknesses of 2, 3, 4, 4½ and 6 inches.

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PC FOAMGLAS

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PROBLEMS:

1. Vinyl Resins—
Control in Inspection
and Cutting Rooms

2. Plastics Storage Room—
Constant Temperature
and Humidity

3. Resin Plastics—Cooling
for Manufacture

SOLUTIONS:

1. Maintaining 80° Temperature
and 20% Relative Humidity

2. Maintaining 60° Temperature
and 15% Relative Humidity

3. Cooling Alcohol B...
1750 G.P.M. to ... F.

How Carrier is Serving the Plastics Industry

• Many modern plastic materials are hygroscopic. This means they absorb varying degrees of moisture when exposed to uncontrolled air.

Unless the absorption of moisture is retarded or the excess moisture is removed, the plastic manufacturer or moulder is faced with the serious problems of inferior quality and a high rejection rate of finished products.

The three typical problems and solutions listed above are recent case histories. They are good examples of how Carrier equipment is being used to successfully overcome this moisture problem by providing dependable control of relative humidity—and temperature, with mechanical cooling where refrigeration is required.

Today, all of Carrier's energy is

being devoted to war work. If your production is vital to the war effort and you have a problem involving the control of temperature or humidity, or both, Carrier can help you with 35 years experience in serving plastic processing. Our engineers will be glad to discuss the application of Carrier equipment to meet your requirements.

CARRIER CORPORATION, Syracuse, N. Y.

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AIR CONDITIONING • REFRIGERATION
INDUSTRIAL HEATING



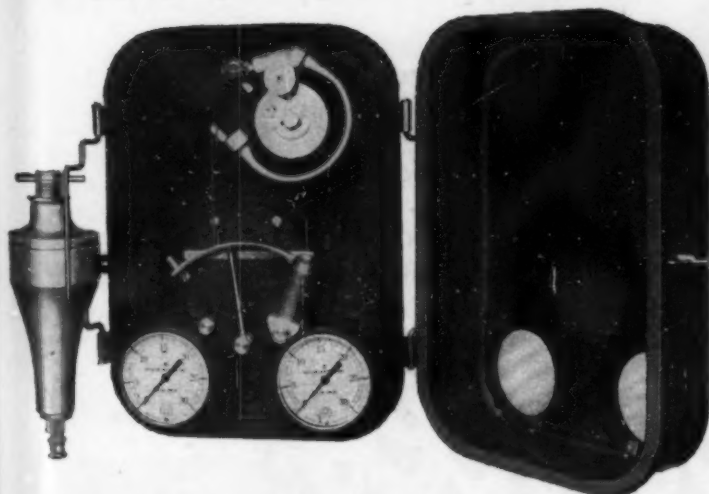
Has the *Answer*

FOR EVERY CONTROL PROBLEM



H-W Type 1400 Pressure Control Pilot **BOURDON TUBE ACTUATED**

Ask the men WHO USE THEM!



Mountable on any H-W Motor Valve Diaphragm Case or for surface instrument panel board mounting. Case is weather-proof with wide-swinging door for easy accessibility to instruments for adjustment, repair or replacement of parts. Levers and other working or moving parts are of stainless or plated steel. Bellows of high grade bronze.

H-W Type 1400 Bourdon Tube Actuated Pressure Control Pilot (Non-Recording) is designed to operate as a Vacuum or Pressure Control Pilot for pressures from vacuum to 5,000 lbs. The Type 1400 Pilot has a wide *Throttling Range* adjustment of from 0% to 200%. Thus, this Pilot is universally adaptable for services requiring extremely high sensitivity or for service conditions where wider *Throttling Ranges* are necessary to dampen the sensitivity. Wide throttling range overcomes cyclic or hunting action caused by over-sized control valves or other conditions existing in the system making lined-out pressure control difficult.

The H-W Type 1400 Pressure Pilot assures performance matching other H-W Control Equipment used throughout the Refining, Chemical, Synthetic, Gasoline, Recycling and Power Industries and is adaptable for:

Vacuum Relief Control
Vacuum Control
Back-pressure Control
Reduced Pressure Control
Fluid Pressure Control
Pump Governor Control

Boiler Fuel Governor Control or any other installation where pilot operation makes for greater sensitivity and smoother control.

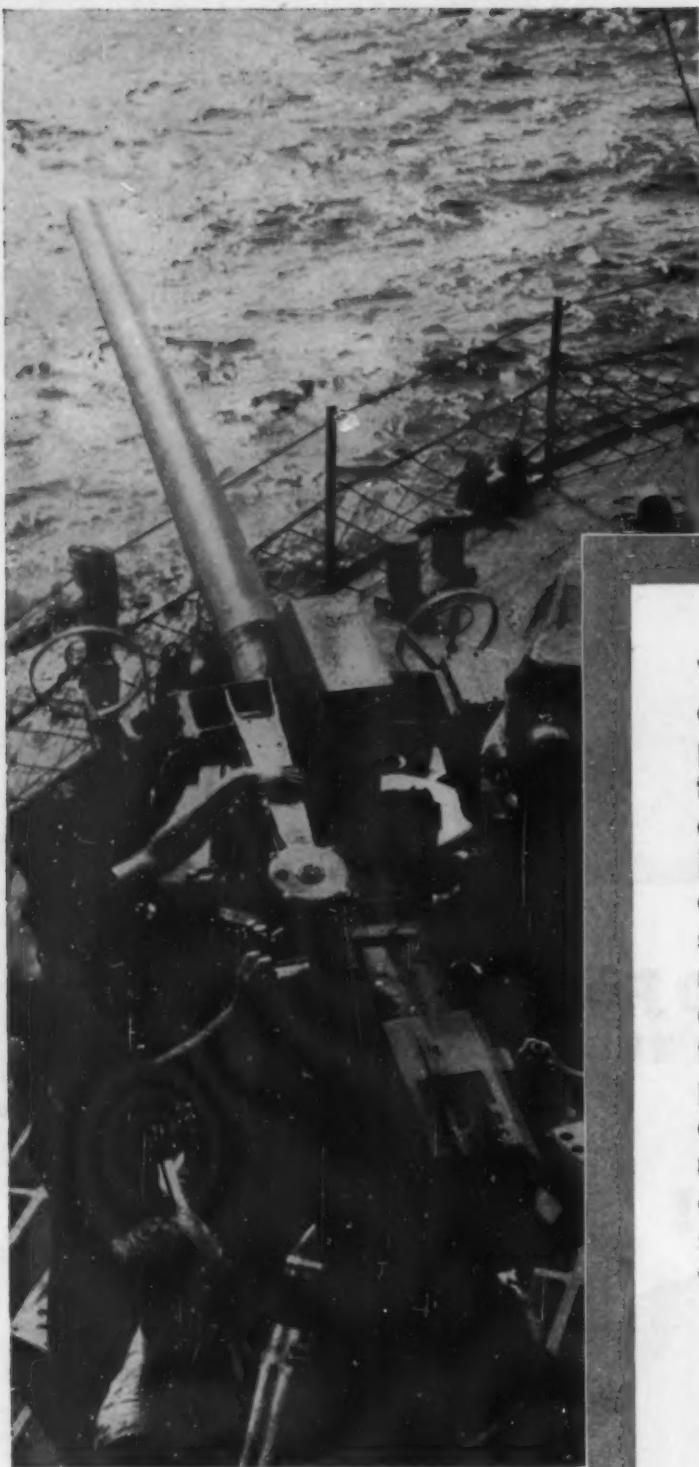
Write for Operation Bulletins describing H-W Pressure Control Pilots, giving us detailed information of your control requirements.

STANDARD FOR *Performance*

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TULSA, OKLAHOMA

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Official Navy Photograph

GEARS... GUNS... AND MEN!

Today's victories of our armed forces are the result of their superior fire power on land and sea . . . and in the air — a superiority attained by design engineers working in conjunction with the army and navy ordnance departments. Victory and success depend on gun calibre and range . . . also its maneuverability and the clock-like precision of the firing mechanism . . . D.O. James precision-made gears are important controlling factors in attaining the maximum fire power and efficiency of many of the guns now being so successfully used by our armed forces.

Accurately conforming to these design requirements has been an every-day "must" in our organization for over 55 years in the design, engineering and manufacture of all types of gears and gear speed reducers.

D.O. James

**Established
1888**

D.O. JAMES MANUFACTURING CO., 1140 W. MONROE STREET, CHICAGO, ILL.

WeldELLS

*have
everything★*



"They're built to give the man on the job a hand"

FROM the way they pile the work on me these days you'd think my job as foreman of the pipe crew is to put in the piping today that the front office won't finish planning till tomorrow!

The front office crowd might consider that laying it on a little thick. But whatever they think, they will have to admit that we have kept up with their wildest demands and done the job right, too.

Of course the main credit for that goes to fellows who do the work. But down to the last man they would be the first to agree that they couldn't have covered as much ground, or

covered it as well, if it hadn't been for their old friend, WeldELLS.

WeldELLS and other Taylor Forge Welding Fittings are built to step in and give a hand. You don't have to grope for the proper size because size and weight are marked right there on the fitting. Tangents make them easy to line up. Accurate lathe bevels and lands make welding fast and sound. Precision quarter-marks guide the work.

If you want a fast job—a sound job—an economical job—take a tip from me and use the welding fittings that have *everything!*

★ WeldELLS alone have all these features:

- **Seamless**—greater strength and uniformity.
- **Tangents**—keep weld away from zone of highest stress—simplify lining up.
- **Precision quarter-marked ends**—simplify layout and help insure accuracy.
- **Selective reinforcement**—provides uniform strength.
- **Permanent and complete identification marking**—saves time and eliminates errors in shop and field.
- **Wall thickness never less than specification minimum**—assures full strength and long life.
- **Machine tool beveled ends**—provides best welding surface and accurate bevel and land.
- **The most complete line of Welding Fittings and Forged Steel Flanges in the World**—insures complete service and undivided responsibility.



The list of Taylor Forge's contributions to the war effort only begins with WeldELLS. One of many examples is Taylor Corrugated Marine Furnaces, essential to many merchant ships and transports.

* WeldELLS and many other Taylor Forge products are produced in Byers Genuine Wrought Iron.

TAYLOR FORGE & PIPE WORKS, General Offices & Works: Chicago, P. O. Box 485
NEW YORK OFFICE: 50 CHURCH ST. • PHILADELPHIA OFFICE: BROAD ST. STATION BUILDING

CHEMICAL & METALLURGICAL ENGINEERING • DECEMBER 1943 •



ONE-PROFIT FABRICATION

Vital needs of War Industries for welded process equipment are being answered regularly by the Edge Moor shops. As usual, time is a basic factor and on this score, Edge Moor services have become increasingly valuable to industry. For example, high pressure, high temperature, non-corrosive, welded fabrications—made to your specifications—are completed without our having to look to secondary sources for any part of the work. Invaluable time is saved and costs are lowered because secondary profits are eliminated.

Whatever your process equipment fabrication requirements, let Edge Moor do the work. We meet all codes, being equipped for Class One welding, Stress Relieving, Annealing and X-Ray. Send your designs and specifications for prompt quotations.

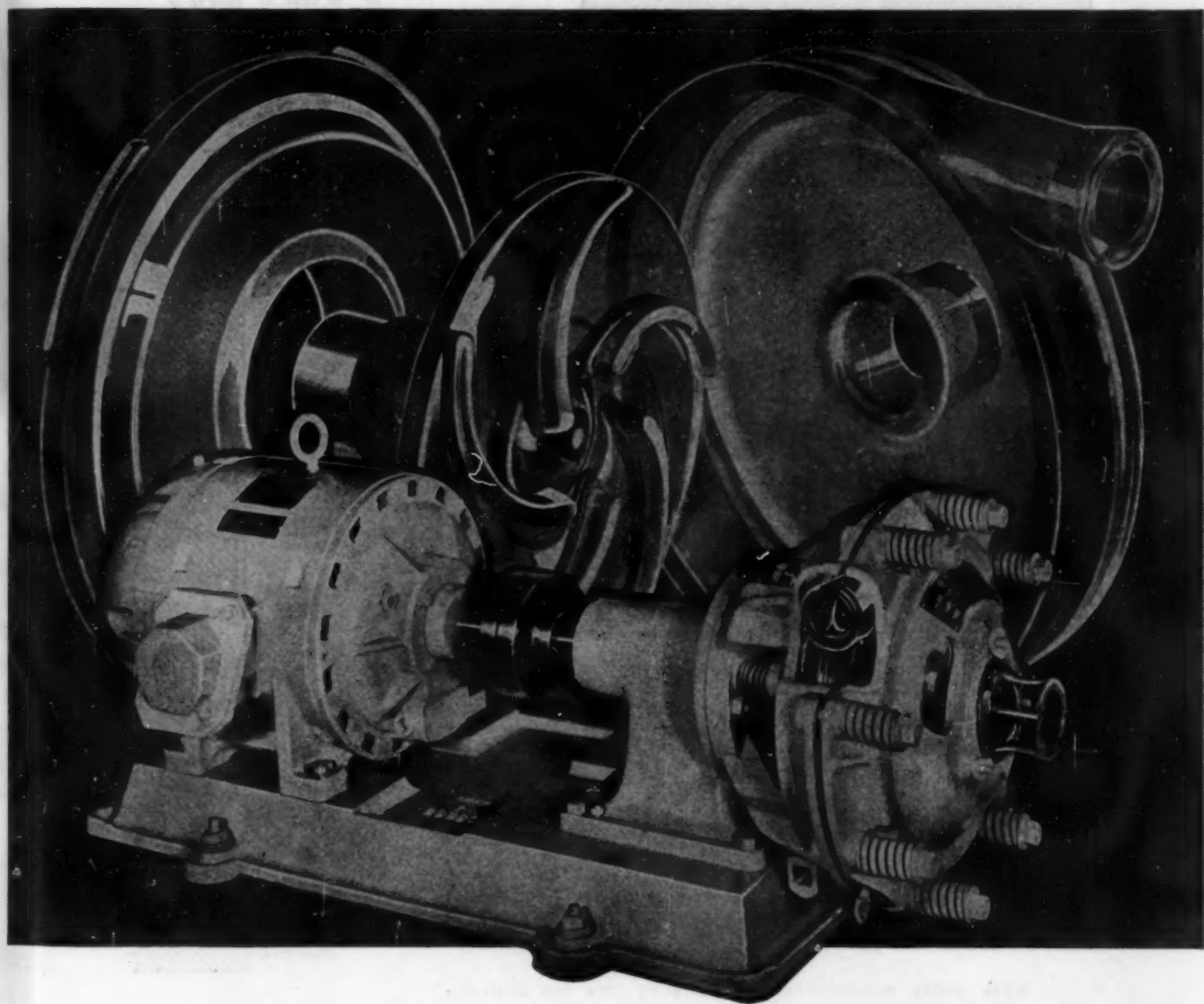
PROCESS EQUIPMENT FABRICATORS

EDGE MOOR
IRON WORKS, INC.

MAIN OFFICE: EDGE MOOR, DELAWARE

BRANCH OFFICES: NEW YORK CITY: 30 ROCKEFELLER PLAZA
CHICAGO, ILL.: 1 NORTH LA SALLE STREET

Handle hot corrosive acids, or brine chilled liquids, with the Nash Pump of Glass

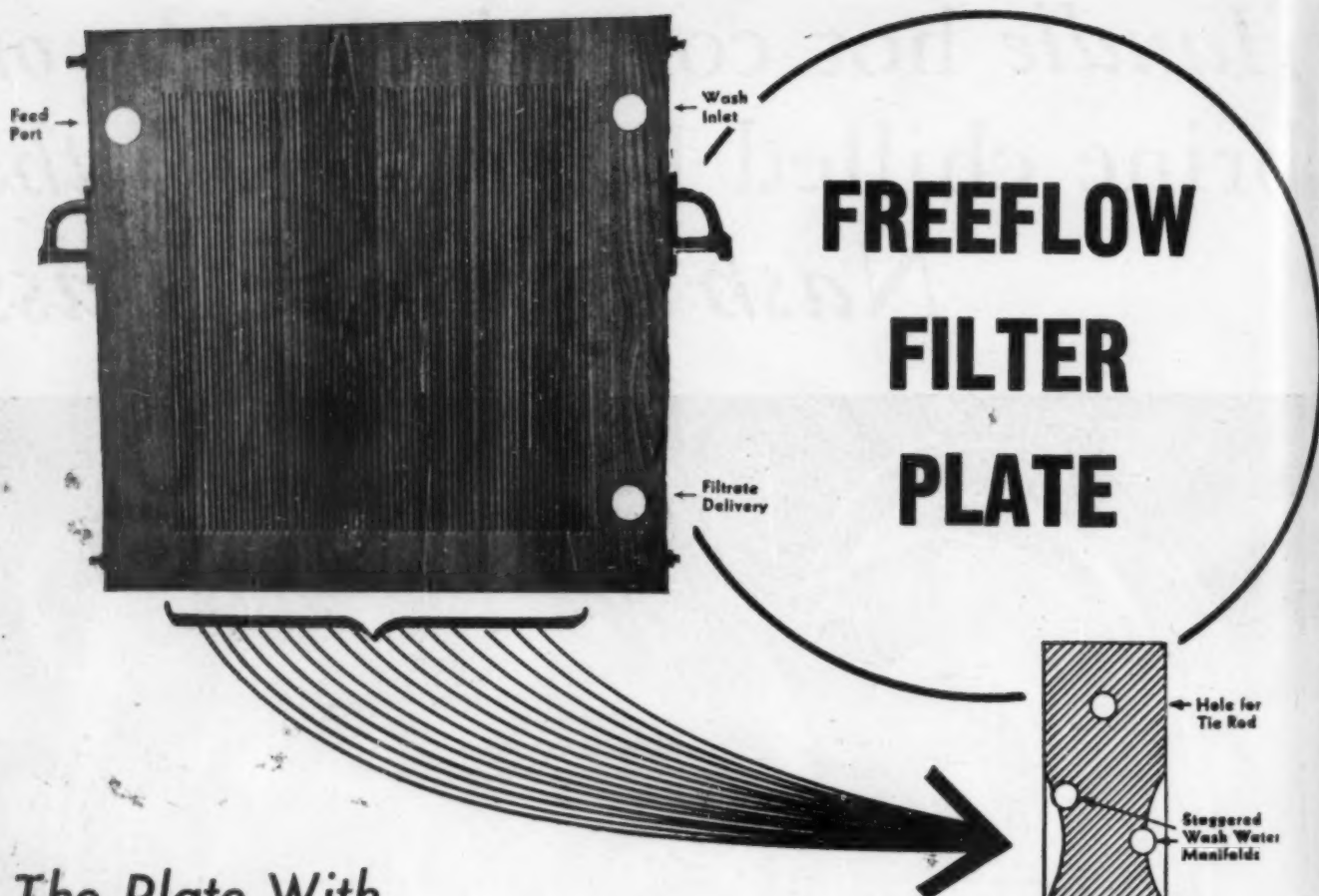


Casing and moving element of this remarkable centrifugal pump are of "PYREX" brand heat and shock resisting glass. Hot acids, or brine cooled liquids may be pumped with equal facility. • The balanced glass impeller, rotating at 1760 R. P. M., delivers 6000 gallons of acid or other liquid per hour against a 65 foot head. • Perfect transpar-

ency permits constant observation of the interior of this pump and the material being handled. If cleaning is necessary, pump can be taken apart in a few moments. Reassembly is as quick, and adjustment is almost automatic. • There are many more exciting facts about this successful non-metallic pump. Write for your copy of Bulletin D-313 now.

NASH ENGINEERING COMPANY
2071 WILSON POINT ROAD, NORWALK, CONN.

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The Plate With The Tapered Drainage Channels

No other filter plate on the market can offer this advantage . . . and it is a distinct advantage to the operator. The increasing depth of the drainage channels provide extra space where it is needed most . . . at the point of maximum filtrate accumulation.

This feature in itself makes the FREEFLOW Filter Plate the better buy. But consider these additional features:

- 1 . . . narrow channels, providing broader supporting surfaces for the filter cloth
- 2 . . . filtrate manifolds that are located under the lands which support the filter cloth . . . thus precluding any restriction to filtrate flow at this point
- 3 . . . wash water manifolds feeding directly into the drainage channels, facilitating washing flow and increasing washing efficiency

Why not equip one of your presses with FREEFLOW Filter Plates and Frames and make a competitive test against those of other design? We can furnish plates and frames constructed of Pine, Cypress, Maple or Bakelite to fit any standard filter press.

FILTER MEDIA CORPORATION

Specialists in Filter Cloth for Industrial Filtration

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Garbage and Refuse
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On Battle Ships—in Far Distant Islands—in the African Campaign—in Alaska—GRUENDLER Equipment in the War as in peace time, is doing an important job, a big job. New developments in Equipment Efficiency have been made and will be announced Post War.

LET US ALL WORK FOR VICTORY NOW



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This is a full-rate Telegram or Cablegram unless its deferred character is indicated by a suitable symbol above or pre-

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TO THE MEN AND WOMEN OF GRUENDLER CRUSHER AND PULVERIZER CO=

2223

SYMBOLS	
DL	Day Letter
NL	Night Letter
LC	Deferred Cable
MLT	Cable Night Letter
Ship Radiogram	
at point of destination	

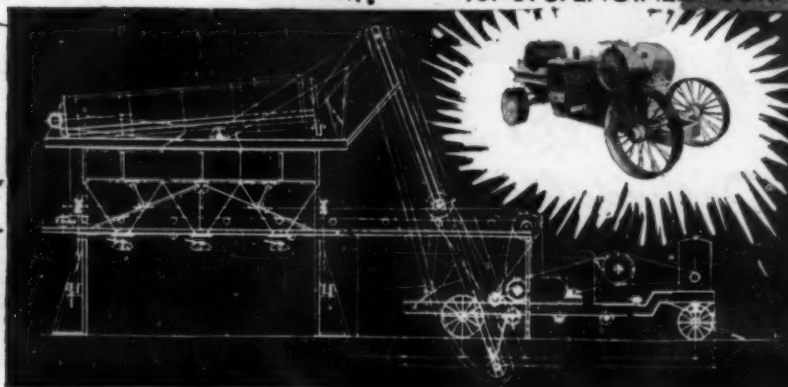
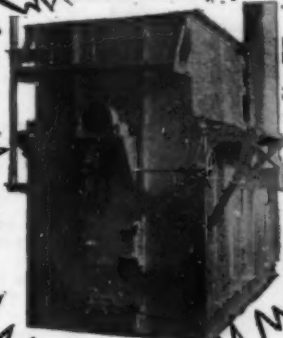
A US AIRCRAFT CARRIER, WHICH HAS STEAMED OVER 111,000 MILES ON VITAL MISSIONS DURING THE PAST TWO YEARS, REPORTS THAT YOUR GARBAGE GRINDER, CRUSHER AND PULVERIZER FUNCTIONED EFFICIENTLY AT ALL TIMES. THE SAFETY AS WELL AS THE CLEANLINESS OF GARBAGE DEPENDS IN NO SMALL MEASURE ON THE PROPER DISPOSAL OF GARBAGE. YOUR EQUIPMENT, IN DISPOSING OF GARBAGE WITHOUT A TRACE, IS VITAL TO OUR SHIPS OPERATING IN SUB-INFESTED WATERS=

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Portable Crushers for U. S. ENGINEER CORPS

Commission/1



Portable Crushing Plants for "Sea-Bees"—U. S. Bureau of Ships and Docks

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"ESOTOO"*—

FOR FASTER PRODUCTION

Speed and more speed are today's demands on production—Quality *IN QUANTITY* is what counts at the finish line.

Resourceful production managers are eliminating every possible secondary or intermediate operation—all hands to the finish lines.

"ESOTOO"* can help speed up production in many processes:

- Saves man-hours at the sulfur burner.
- Delivers clean, cool, 100% SO₂ to the process.
- Helps prevent unpredictable side reactions.
- Assures positive control—quality protection.

What is your problem?

*"ESOTOO" is Virginia's Trade Name for Liquid Sulfur Dioxide

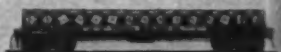


**VIRGINIA SMELTING
COMPANY**
WEST NORFOLK, VIRGINIA

About Shipments—



Portable cylinders containing 150 lb., semi-portable drums containing 2000 lb. liquid SO₂. L. C. L. or carload.



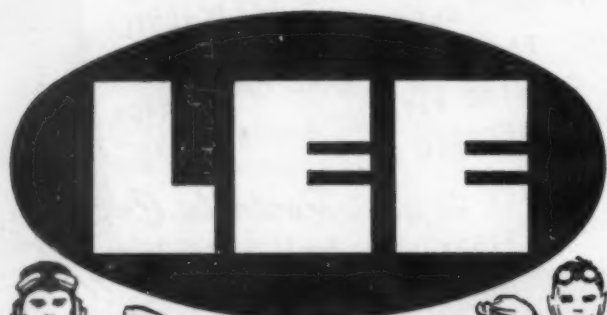
Carload: 15 drums on multi-unit car frame; 30,000 lb. For users without storage facilities.



Tank car lots of 40,000 lb. for users equipped with storage facilities.

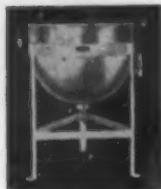


Prompt shipment on receipt of order from the strategically located works of the largest producer of liquid sulfur dioxide in the U. S.



Dependable Processing KETTLES—anywhere

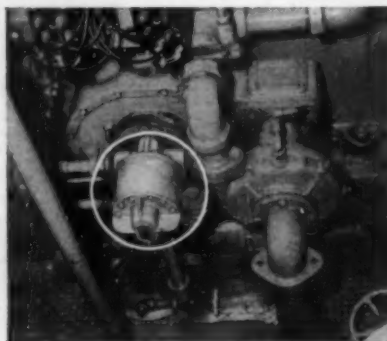
With Lee Stainless Steel Kettles on the job you are sure of better, faster processing. They're durable, corrosion resistant, easy to clean,—thoroughly dependable—that's why they're top favorites in the service of our armed forces and essential industries everywhere. May we send you our descriptive catalog?



LEE METAL PRODUCTS CO., Inc.
412 Pine Street • Phillipsburg, Penna.



**Roper Rotary Pumps are on
the job 24 hours per day!**



QUICK FACTS

Roper Pumps are built in capacities of 1, 3, 5, 10, 15, 20, 35, 50, 75, 100, 150, 200, 300, 500, 750 and 1000 gals. per minute.

Pressure up to 1000 lbs. per square inch.

Speeds up to 1800 revolutions per minute.

Mountings and Drives for any practical purpose including direct mounted, gear driven, V-belt, flat belt, chain and hand operation.

At the Douglas Aircraft Company's new blackout plant in California, Roper Rotary Pumps are doing their part in stepping up plane production. The Roper equipped air compressor, illustrated above, provides power for hundreds of air tools throughout the plant.



Write for Catalog 1241

ROPER
Rotary Pumps

GEO. D. ROPER CORP., ROCKFORD, ILL.

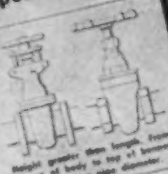
HOW TO KNOW VALVES

Recognition Chart for New Men in Industry

types

GATE VALVE

appearance



Height greater than length, from bottom of body to top of bonnet more than twice pipe diameter.

service

1. Straight-way flow.
2. For stop and go only.
3. No throttling.
4. Least flow resistance.



operation

The wedge or disc shuts across the flow stream.

used

1. Used on lines where valves are operated wide open or completely closed.
2. Used where least pressure drop is important.

symbols

gate open



gate closed

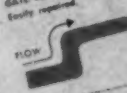


GLOBE VALVE



Protruded or stem-guided body, more than GATE VALVE.

1. Turns from right to left to full-opening stream.
2. Changes direction of flow.
3. More quickly mounted than GATE VALVE.
4. Easily repaired.



Plug or disc is forced into a tapered opening, diaphragm or valve is raised ring around the opening.

1. Used where flow must be regulated.



globe

LIFT AND SWING



A Globe Valve without the stem.

1. Permits flow within a pipe line in one direction only.
2. No flow resistance in facing closed.
3. Considerable flow resistance in lift closed.



Flow in one direction lifts disc as ball at rest, gravity closes it.

1. Used where flow in one direction ONLY is required.



check



Cylindrical plug body. Tapped by square head on plug.

1. Can be opened or closed quickly.
2. Handles thick fluids or fluids having solids in suspension well.
3. Handles carbon chemicals very well.



A cylindrical member rotates in the flow channel to shut it.

1. Used for diverting flow.
2. Chief use in process lines handling gases or other liquids with solids in suspension or heavy oils or tar or fluids that would clog or build up on valve.



cock

... Glad to send you this useful chart

This 12" x 9 1/2" chart originally was prepared to give new men in industry a quick way to classify valves • Classify valves by type; identify them by outward appearance; appreciate the services for which each type is suited; explain the broad principles on which valves operate, classify valves as to use and show the symbols by which each type is indicated on piping layouts • Experienced men, seeing these charts, also have asked for one for their own use. So we have printed a quantity in two colors on heavy cardboard—convenient for wall tack-up or filing.

Glad to send you a copy. Address our offices in Reading, Pennsylvania.

READING-PRATT & CADY

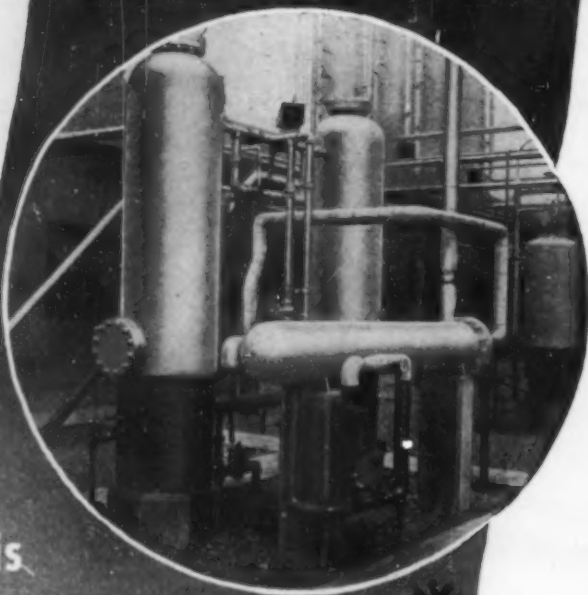
MANUFACTURERS OF
READING CAST STEEL VALVES AND FITTINGS • PRATT & CADY BRASS AND IRON VALVES
D'ESTE VALVE AND ENGINEERING SPECIALTIES

Reading, Pa., Atlanta, Boston, Chicago, Houston, Los Angeles, New York, Philadelphia, Pittsburgh, Portland, San Francisco

DIVISION OF AMERICAN CHAIN & CABLE COMPANY, Inc., BRIDGEPORT • CONNECTICUT

CHEMICAL & METALLURGICAL ENGINEERING • DECEMBER 1943 •

The hard,
granular, stable
DESICCANT
in this
NEW Propane Dryer



is

Florite*

Adapted for any use that other granular desiccants will serve, FLORITE has a marked advantage in longer-sustained effectiveness which, combined with low initial cost, results in superior economy. Natural gas, propane, butane, gasoline, air, nitrogen, carbon dioxide, refrigerants of various nature, and other fluids are successfully dried with FLORITE, and in connection with the most exacting processes. FLORITE selectively absorbs 4 to 20% of its weight of water—is regenerated by heating to 350°F. Correspondence is invited.

*Trademark Registered

FLORIDIN COMPANY, INC.

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ELECTRO-CHEMICAL

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SODIUM CHLORATE

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POTASSIUM CHLORATE

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THE sale and distribution of the chemicals listed above are covered by General Preference Order M-171. Our New York Office will be pleased to advise customers regarding the Preference Order, and furnish the necessary forms.

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the new age of STEEL

Creative steel-making at Midvale is a partnership of imagination and science. Together they have perfected the most valuable alloys known to the industry. Together they look forward to challenges of the future. Whenever the question arises: "Can this be made of steel successfully?" Midvale welcomes the opportunity to look at the blue prints.

MIDVALE

Custom Steel-Makers to Industry



"E" with four stars

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In use **TODAY** in **TODAY'S** vital War Industries

KINNEY

**SINGLE STAGE
DRY VACUUM PUMP**

Each day sees new uses for KINNEY Single Stage Dry Vacuum Pumps. In addition to their more usual applications, they are backing diffusion pumps in producing vitamins A and E, are "standard practice" in magnesium production, are widely employed in the penicillin program and for lens coating—and have many other interesting production and laboratory uses which can be revealed only when the war is won.

Write for Bulletin 18

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MANUFACTURING COMPANY**
3551 Washington St., Boston 30, Mass.

PENICILLIN
VITAMINS
A AND E
ELECTRONIC
TUBES
MAGNESIUM

DEHYDRATED
FOODS

LENS
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METALS



We also manufacture compound vacuum pumps, liquid pumps, clutches and bituminous distributors.

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TOWERS
STANDPIPES
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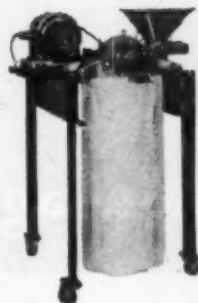
Maritime "M" Merit Award

R. D. COLE MFG. CO.
Established 1854
NEWNAN, GEORGIA

Tank
Builders
for over
80 Years

UNSKILLED HELP

Trained manpower is not needed for the operation of dustless Mikro-Pulverizers. A new man (or woman) can get to work on a Mikro and in five minutes you'll be enjoying all the advantages of fine grinding with particle sizes *mechanically* controlled. Mikro-Pulverizers reduce pulverizing costs all along the line. They cut power costs, save floor space, cut cleaning time in half. Send for 32 page catalog.



IF YOU'RE INTERESTED IN MAKING POWDERED METALS, WE HAVE SOME NEW INFORMATION WHICH WILL INTEREST YOU. WRITE US.

PULVERIZING MACHINERY COMPANY
55 Chatham Road • Summit, New Jersey

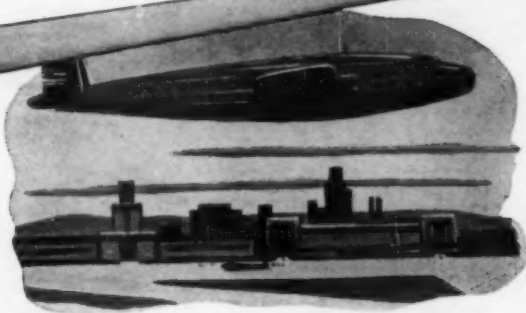


MIKRO-

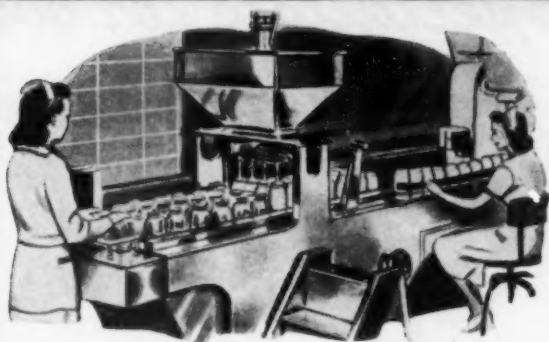
*Reg. U.S. Pat. Off.

PULVERIZER

Filling Prescriptions with Steel!



1. BETTER STEELS! This country needs aircraft that fly high and far . . . and hit hard. It needs ships in great numbers. It needs tanks that can take it when the going gets tough. It needs equipment to outperform any on earth. All these things require many special steels. Such steels with needed properties are created through the use of *alloys*. Basic peacetime research by ELECTRO METALLURGICAL COMPANY, a Unit of UCC, has developed many important steels and the alloys to make them, such as chromium, silicon, manganese, vanadium, tungsten, calcium, and columbium . . . all vital today.



2. STAINLESS STEELS! The development of steels of high chromium content gave designers and engineers a whole family of new materials with which to work. Such steels resist rust and corrosion, and are easily kept clean. They are essential in the food industry. Possessing great strength in addition to their corrosion resistance, they save weight in trains and planes. They have brought improvements in the oil, chemical, textile, and other fields . . . with resultant savings to you. Low-carbon ferro-chromium, an Electromet development, is essential in the large-scale production of stainless steels.



3. NEW NATIONAL RESOURCES! Tungsten and vanadium are essential to steelmakers. Long before war clouds loomed, many felt that more of this country's domestic sources of these metals should be developed. Engineering research by UNITED STATES VANADIUM CORPORATION, another UCC Unit, found efficient ways of refining low-grade ores. This enabled U. S. VANADIUM to revitalize old mines with new mills and methods, and make America less dependent on foreign sources for her increased needs of tungsten and vanadium.



4. BUILDING TOWARDS THE FUTURE! Alloy steels offer still greater promise for the future. Bridges and other structures will be made still lighter, stronger, and longer-lasting by wider use of some of the steels with which engineers are already experienced. Trains, trucks, and aircraft will be made lighter, stronger, faster, and safer. Better cars and tractors, homes and home equipment will be made through their use.

Units of UCC do not make steel. They do make ferro-alloys used to purify and give special properties to steel. They also make non-ferrous alloys which, because of their exceptional resistance to wear, heat, and corrosion, are used as cutting tools, hard-facing welding rods, and for other purposes. UCC research and developments mean ever-new and improved alloys for industry . . . and ever-better products for you.

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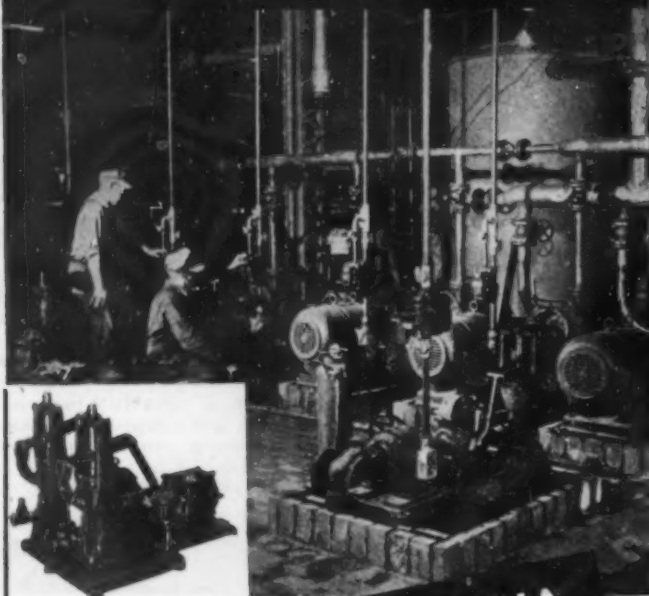
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and for the **SUSTAINED, ACCURATE FEEDING OF Volatile Liquid Intermediates USED IN THE MANUFACTURE OF Plexiglas**

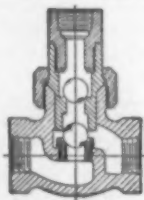


"L" Type Dual Unit. One of 8 types in over 200 sizes available in the Hills-McCanna Line.

HILLS-McCANN
Positive PROPORTIONING PUMPS
WITH POSITIVE ACTING CHECK VALVES

... handling also
**ACIDS • ALKALIS • SLURRIES • SALTS
DYES • SOLVENTS • EMULSIONS • INHIBITORS
ETC. • IN GENERAL CHEMICAL PROCESSES**

Having pioneered in the application of single plunger type pumps to chemical processes of all kinds, Hills-McCanna naturally have been looked to for authoritative service in adapting proportioning pumps to newer processes such as the manufacture of Plexiglas.



All Hills-McCanna Pumps are provided with check valves to suit the liquids pumped. Shown is our Horizontal Composite, Positive - Acting Check Valve, combining suction and discharge in the same body. This valve minimizes air-binding, friction, drop and turbulence.

The exacting demands of such modern, scientific operations are more than met by Hills-McCanna Pumps, which provide highly accurate dosages, precision control, mechanical regularity, continuous duty, thoroughly dependable performance—with minimum maintenance.

They have amply proven their low-cost service over many years of varied application. Let our engineer-specialists work with you on any feeding or injecting situation.

Catalog P-41 on request.

HILLS-McCANN CO.
2341 NELSON STREET, CHICAGO

PROPORTIONING PUMPS • AIR & WATER VALVES • CHEMICAL VALVES
MARINE VALVES • FORCED-FEED LUBRICATORS • DOWMETAL CASTINGS



"SURE--YOU CAN GET SERVICE ON VIKING ROTARY PUMPS"
Call Your Nearest
VIKING REPRESENTATIVE

Do you have a pump maintenance problem? Is your pumping installation operating with highest efficiency? Viking's nation-wide sales and service organization would like to help you. Write or call the Viking representative nearest your plant:

CHICAGO
Viking Pump Company
548 West Washington Blvd.
Phone State 6819

CLEVELAND
Viking Pump Company
310 Marshall Building
Phone Cherry 9887

INDIANAPOLIS
Viking Pump Company
325 Fenway Building
Phone Lincoln 4798

KANSAS CITY
Viking Pump Company
681 Federal Building
Phone Harrison 8833

LOS ANGELES
Viking Pump Company
2040 South Santa Fe Ave.
Phone Kimball 4470

MILWAUKEE
Viking Pump Company
610 West Michigan Street
Phone State 9887

NEW YORK
Viking Pump Company
1841 Broadway at 51st St.
Phone Circle 7-3334

BALTIMORE
Wallace Stebbins Company
Charles and Lombard Streets

BOISE
The Olsen Manufacturing Co.
P. O. Box 1487

BOSTON
Haynes Pump and Machinery Company
155 Purchase Street

BUFFALO
Best Heat & Company
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Ezer Machinery Company
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DENVER
Hendrick-Bathke Company
1835 Seventeenth Street

HOOVER
Southern Engine and Pump Co.
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Holt La Vie Supply Co.
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I. E. Dismuth Company
247 South Front Street

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NEW ORLEANS
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PITTSBURGH
Power Equipment Company
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PHILADELPHIA
Walter H. Egan Company
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RICHMOND
Richmond Engineering Company
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SAN FRANCISCO
De Level Pacific Company
61 Beale Street
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ST. LOUIS
Lane Machinery Company
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Warner Lewis Company
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VIKING Pump COMPANY
CEDAR FALLS, IOWA

*Specialists for over
a generation in*

**OIL
IMMERSED
MOTOR
CONTROL**

ROWAN CONTROL
THE ROWAN CONTROLLER CO., BALTIMORE, MD.

MORALE...

in Bags

Morale among fighting men depends upon full mess kits, and Uncle Sam spares no effort to see that his warriors on land and sea are the best fed in the world.

Getting this all important food to the men on our far-flung fronts in a sound, wholesome condition is just as important as "keeping their powder dry." It's a task that calls for wide experience and know-how...a task the bag industry has taken in its stride.

In the 22 Bemis mills and factories more than 8,000 employees have made millions of bags to protect and transport food over land and sea, from farm and factory to fighting men. We like to think this our contribution to morale for Victory. In addition to this important work, we still find time to supply industry and agriculture with bags for other war materials and essential civilian goods.

Chemical Industry Cuts Costs and Reduces Losses With Bemis Multiwall Paper Bags

Bemis Multiwall Paper Bags for chemicals are economical, one-trip containers that guard against moisture and thus reduce caking and loss of quality. Their extra multiple strength maintains output by minimizing breakage on production lines. Bemis patented self-forming gussets speed filling and closing. Brilliant Bemis printing makes brands stand out.

Let us work with you in supplying bags for your war or civilian production. From the bags themselves to their filling, closing, shipping and storing, our staff of experts can help you. If you have a packaging problem... present or future... let's talk it over.

BEMIS BAGS



BEMIS BRO. BAG CO.

Peoria, Ill. • East Pepperell, Mass. • Mobile, Ala.
 San Francisco, Calif. • Wilmington, Calif. • St. Helens, Ore.
 Baltimore • Boston • Brooklyn • Buffalo • Charlotte • Chicago • Denver
 Detroit • Houston • Indianapolis • Kansas City • Los Angeles • Louisville
 Memphis • Minneapolis • New Orleans • New York City • Norfolk • Okla-
 homa City • Omaha • St. Louis • Salina • Salt Lake City • Seattle • Wichita

BETTER BAGS FOR 85 YEARS

Among the bags produced for war service by Bemis are Multiwall Paper Bags slipped over cloth bags for foods to be shipped overseas. These packages are especially designed so they can be tossed into the water and carried ashore without damage to contents.



3 Way Protection for Volatiles



Penetrative solvents, high volatiles, oils and compressed gases such as butane and propane are carried with safety in PENFLEX, All-Metal plus Rubber, All-Purpose Hose.

Heavy gauge 4-wall interlocking joint PENFLEX, with bronze or steel inner tube made from a single strip of helically-wound metal, flexes without strain; but the metal itself DOES NOT BEND.

Inherent electro-static protection plus rubber, wire and fabric reinforced, vulcanized from coupling to coupling, gives added protection to materials carried.

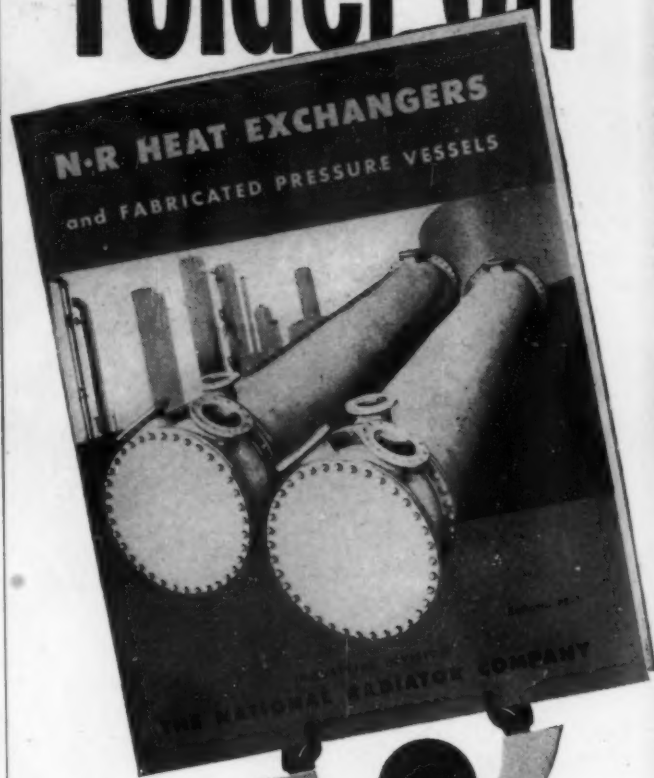
PENFLEX, with range of working pressures to 500 pounds per square inch (other types up to 12,500 P.S.I.), depending on size and type of construction, is available with fittings and couplings for all types and sizes of hose.



For detailed information about PENFLEX All-Purpose Hose, tight as pipe but flexible, send for Bulletin 80.

PENNSYLVANIA FLEXIBLE METALLIC TUBING CO.
7234 Powers Lane, Philadelphia, Pa.
ESTABLISHED 1902

NEW Folder on



Write for

Illustrated Bulletin PE-1

on your letterhead...

INDUSTRIAL DIVISION

The **NATIONAL RADIATOR Co.**

225-I Central Avenue • Johnstown, Penna.



Brass for Oil—the Two-Edged Sword...

Yes, oil, being the source of both gasoline and synthetic rubber, is a mighty two-edged sword that carries double cutting power in attacks on the enemy today. And in the refining and production of these two vital materials, tons and tons of copper alloy heat exchanger and condenser tubing play a vital part.

To stand up longer against corrosion, Bridgeport has developed special alloys such as Arsenical Admiralty which resists destruction from both oil and polluted waters; Bridgeport Arsenical Muntz designed for corrosive sulphur bearing oil as well as for bad water; also Bridgeport Duplex Tubing which combines a wall of brass, copper or cupro nickel with another of steel or aluminum, etc. Other alloys are also available for special conditions.

The characteristics of Bridgeport tubing alloys are described in our new Condenser Tube Manual. Engineers will receive valuable help from the section on corrosion research, the latest specification data, the methods of installing tubes, and from its numerous tables and general information. Write for your copy today.

CLIP AND SEND
FOR YOUR FREE COPY

Name _____

Position _____

Company _____

Street _____

City _____ State _____

Do You Use Condenser Tubing? _____

Shall We Send Technical Adviser? _____

Any Corrosion Problems? _____



BRIDGEPORT BRASS COMPANY
BRIDGEPORT 2, CONN. • ESTABLISHED 1865

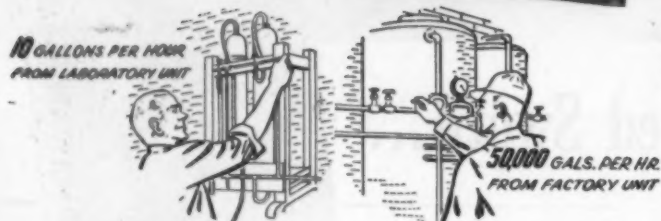
BRIDGEPORT



BRASS

DE-IONIZED WATER REPLACES

DISTILLED WATER



10,000 GALLONS FOR LESS THAN \$1

Actual installations, with capacities ranging from 10 gallons an hour to 50,000 gallons an hour, are in operation in many leading industries. The water produced is *uniform at all times*, regardless of size of equipment.

ILLCO-WAY DE-IONIZING UNITS are producing water comparable to distilled water in these industries, to mention only a few:

SYNTHETIC RUBBER	AIRCRAFT ENGINE
ALUMINUM	MIRROR
METAL PLATING	CERAMIC
EXPLOSIVES	PHARMACEUTICAL
SILICA GEL	CHEMICAL
BUTADIENE	DISTILLERIES
AVIATION GASOLINE	LABORATORIES

SEND FOR LITERATURE TODAY!

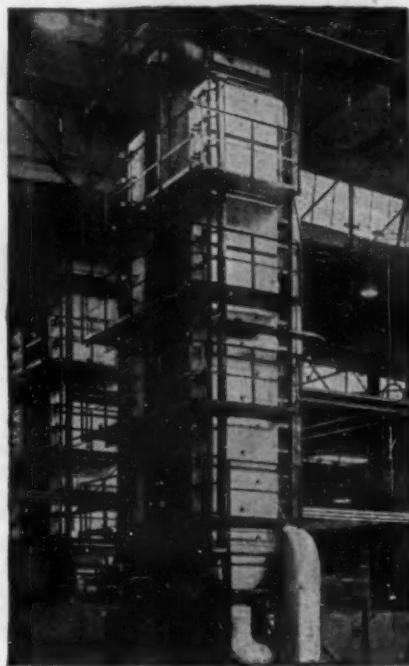
ILLINOIS WATER TREATMENT CO.

844 CEDAR ST.



ROCKFORD, ILL.

BRIGHTENING FURNACE, 44 ft. high, for use with Continuous Electrolytic Tinning Lines...Furnaces and Tinning Lines engineered, fabricated and installed by Brandt.



Big Installations
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Call BRANDT of Baltimore

*for Precision in Heavy Plate
and Sheet Steel Work*

Here, at your command, is an 8½ acre plant . . . with the most modern equipment for shearing, rolling, forming, welding and completely fabricating ferrous, non-ferrous and alloy metals to your specifications . . . from the lightest gauge up to and including 1¼" mild steel or ¾" armor plate. Charles T. Brandt, Inc., Baltimore-30, Maryland.



BRANDT of Baltimore—Craftsmen in Metal Since 1890

**Here's How
Proctor
Drying
Research
Works**

Proctor Drying Research Could Have Saved This Firm **\$20,000**



Drying tests are carefully conducted by skilled research engineers, in a laboratory where all latest equipment and data are available.



Based on these tests, preliminary plans are made by competent engineers to determine the size and kind of equipment needed and approximate cost.



Preliminary recommendations are presented to the customer by trained sales engineers who understand industrial drying thoroughly.

Some months ago a chemical manufacturer was confronted with a highly specialized drying problem. Acting in a manner he thought best, he installed equipment that actually was not well suited to his problem. By the time he discovered his error the cost of the equipment plus production delays had already cost the firm \$20,000.00.

It was then that he called on the research engineers of Proctor & Schwartz for help. These engineers studied his problem, made carefully planned tests and presented their recommendations. Upon the basis of these recommendations he purchased equipment correctly suited to his needs and salvaged as best he could the almost new unsatisfactory machinery.

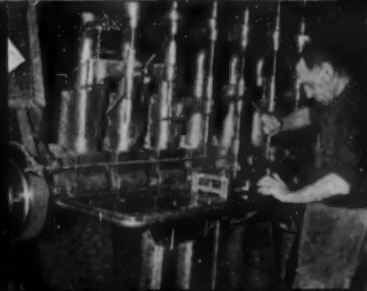
If drying is a part of your manufacturing operation, you'll profit from placing your drying problem entirely in the hands of Proctor & Schwartz. Why spend time and money in trying to solve your own drying problems, without having available the necessary data or equipment?

Proctor engineers have at their finger tips the results of thousands of drying tests, conducted over a period of 60 years. These same engineers have been responsible for most of the major improvements in every type of industrial drying machinery. The services of these practical minded, experienced research men are available to you without cost or obligation. It only makes good business sense to avail yourself of this service.

PROCTOR & SCHWARTZ · INC · PHILADELPHIA
The World's Largest Builders of Industrial Drying Equipment



The order placed, the dryer is designed in exact detail on the drawing boards of skilled, practical drying engineers.



Intelligent interpretation of plans, on the part of craftsmen who build the dryer is the final touch to producing the right machine for each job.

For the
**CHEMICALS
of VICTORY**

Finer grinding, homogeni-
zation, emulsification
with



**PREMIER
COLLOID
MILLS**

which process liquids,
solids or pastes—dispers-
ing the elements of the
material completely—re-
ducing them to micron
sizes unobtainable with
other equipment. Mills
available with capacities
to 3,000 gallons or 24,000
pounds per hour depend-
ing on material to be
processed. Submit *your*
product to our labora-
tories for test.

See Our Exhibit at 19th
Exposition of Chemical
Industries.



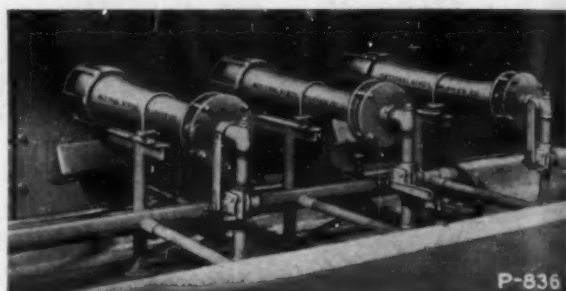
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for Particle Size
Table—a break
down of particle
sizes and their
micron equiva-
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cal and useful to
processors. Avail-
able on request.
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214 OGDEN STREET • GENEVA, NEW YORK
General Sales Office: 100 West 42 St., New York 18, N.Y.

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**NATIONAL
AIROIL
AIROVENT GAS BURNERS**



P-836

**for the Production of
High Octane Gasoline**

The high capacity Airovent Gas Burners shown
here are part of a large installation in a well known
refinery—another example of where National
Airoil Burners and Combustion Engineering Serv-
ice are contributing to our country's war effort.

These gas burners are installed with Tandem Block
Combustion Units in heaters that produce avia-
tion gasoline . . . and are equipped with our exclu-
sive Airocool flame stabilization nozzles. This
feature permits a high turndown ratio with effi-
cient results throughout a wide range of operating
capacity.

Perhaps you have a combustion problem that National
Airoil Burner Company's 31 years specialized experience
in Combustion Engineering can solve. Why not write us
about it today.

**NATIONAL AIROIL BURNER
COMPANY, INCORPORATED**
1235 East Sedgley Avenue
PHILADELPHIA 34, PENNA.



OIL BURNERS . GAS BURNERS . GAS PILOTS . PUMP SETS
EXPLOSION DOORS . ACCESS DOORS . AIR DOORS
BURNER BLOCKS . FURNACE OBSERVATION WINDOWS

Typifying
PATTERSON - KELLEY
Service and Products

A **COPPER-SILICON RE-BOILER**

It's not large — this Re-Boiler — as measured by many jobs going through our shop but it called for some nice engineering and careful construction. Note particularly the workmanship of the beaded tube ends.

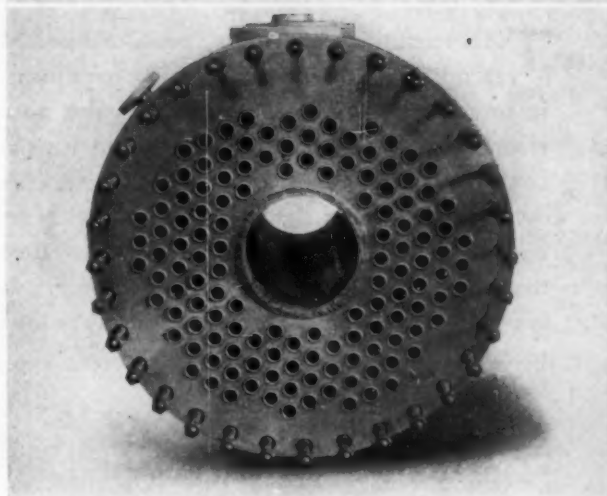
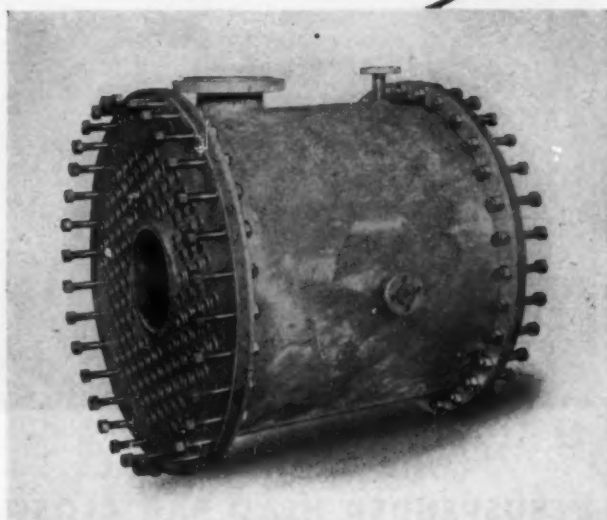
This Re-Boiler provides adequate evidence of the ability of Patterson-Kelley engineers to design processing vessels of special corrosion resisting metals and the ability of shopmen to construct these vessels.

Indeed, it typifies the service Patterson-Kelley can render the process industries on any and all types of pressure vessels, heat exchangers, stills, kettles, cookers, dryers, condensers, towers and tanks.

A letter or call to our nearest office will bring prompt response. To conserve time and travel, outline your problem as fully as possible.

Design statistics include:

Copper-silicon tubes, tube heads and center draft tube. Van Stone flange connections; Alloy-Steel bolts. Flange diameter 48"; length 50".



THE PATTERSON-KELLEY

Main Office and Factory 109 WARREN STREET, EAST STROUDSBURG, PA.

Company, Inc.

BOSTON 16, 96-A Huntington Avenue • NEW YORK 17, 101 Park Avenue • PHILADELPHIA 3, 1700 Walnut Street • CHICAGO 4, Railway Exchange Building

12-PK-6

CHEMICAL & METALLURGICAL ENGINEERING • DECEMBER 1943 •

Handy Man...

IN ANY PLANT



THE UNION SPECIAL SUSPENDED HEAD BAG CLOSER

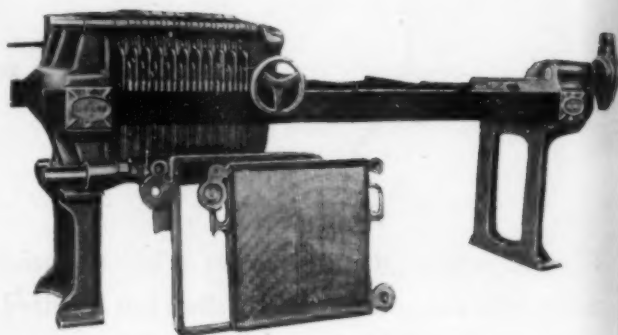
THE versatility of Union Special Suspended Head Bag Closers makes them handy men in any plant regardless of its size. For additional bag closing capacity, for small runs or continuous production, for peak loads or normal demands, they'll fit right into your existing set-up and go to work with a will. They save time, manpower and money and give you strong, neat sewed closures on any type of bag. They're ideal to meet wartime bag closing problems.

State your requirements for complete recommendations on the Union Special equipment to handle your needs.

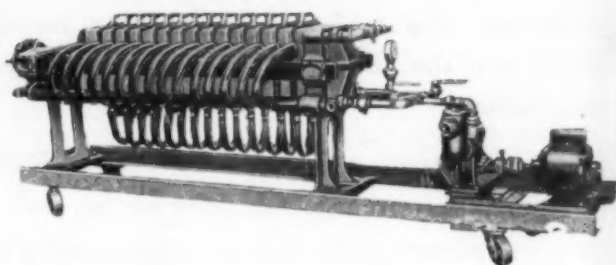
UNION SPECIAL MACHINE COMPANY
424 North Franklin Street • Chicago, Illinois

Union Special
Machine Company

2 MORE FOR TOUGH FILTRATION



Shriver stainless steel filter press, side feed closed delivery with plates and frames machined all over contact surfaces to assure perfect smoothness and accessibility for cleaning to maintain sanitation in filtering delicate organic acids combined with unstable salts. The filter press can be doubled in capacity by addition of chambers.



Shriver filtration unit complete with pump and piping on portable stand; stainless steel construction throughout with filter plates cast hollow for steam or hot water circulation. Any number of chambers can be blanked off to reduce capacity.

These are just samples of the many Shriver units recently installed, where filtration was difficult or required combined difficult conditions of operating pressure, temperature and nature and size of batch for which Shriver Filter Presses are so well adapted.

Write for information on Shriver Filter Presses. T. Shriver & Company, Inc., 802 Hamilton St., Harrison, N. J.

Shriver FOR BETTER FILTRATION
FILTER PRESSES



Modern way to lower costs

Wissco Flexible Metal Conveyor Belts have the stamina and the *in-built* toughness that insure maximum production at low costs, no matter what the operating conditions are . . . white heat or subzero, abrasion, corroding chemicals or other grueling punishment.

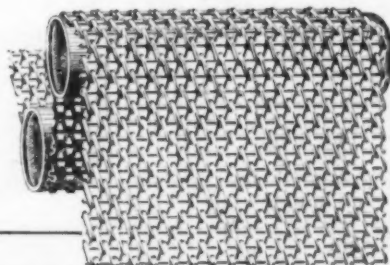
Each Wissco conveyor belt is custom-engineered and manufactured to meet the requirements of a specific job. Back of each belt are 45 years of experience in metal conveyor belt design . . . and a grand total of 122 years of accumulated skill in producing wire and wire products.

Write for the book "Wissco Metal Conveyor Belts". Wickwire Spencer Steel Company, 500 Fifth Avenue, New York 18,—or Buffalo, Chicago, Worcester, San Francisco.

Flexibility? Wissco Conveyor Belt construction permits operation over small diameter pulleys, insuring extreme flexibility and economy in design.

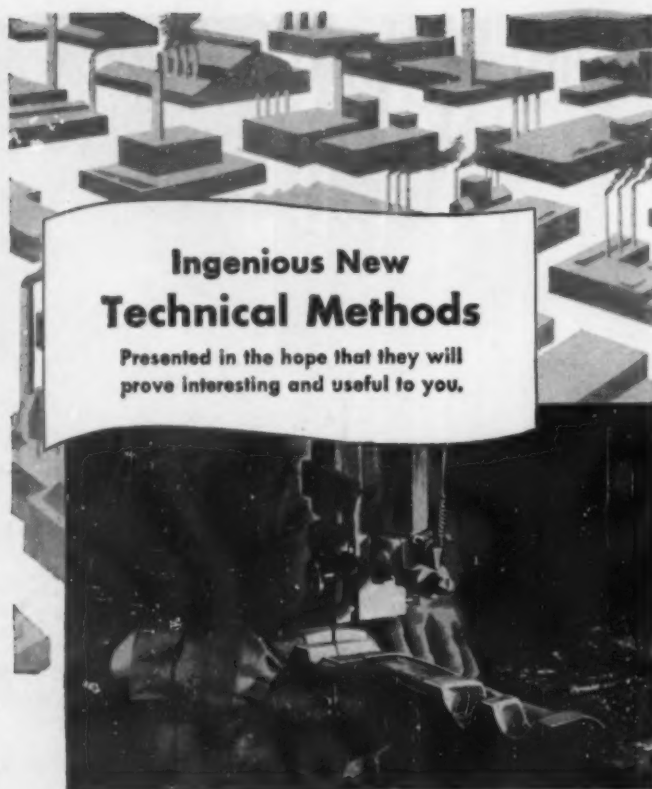
Where they are being used

Annealing Ovens	Dehydrating Food
Hardening Furnaces	Canning Operations
Brazing Furnaces	Chemical Processing
Degreasing	Decorating Glass, Ceramics
Reclaiming Tin, Rubber, etc.	



★ WISSCO ★

CONVEYOR BELTS FOR EVERY PURPOSE



Ingenious New Technical Methods

Presented in the hope that they will prove interesting and useful to you.

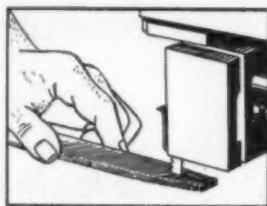
Hard Steels Cut by Heat Generated by Super High Saw Speeds

Ordinary band-saws, when operated at unbelievable high speeds up to 12,000 feet per minute, cut through hard steels and alloys by heat generated from the friction of the saw against the metal to be cut. The cutting effect is more that of burning through the metal than actual cutting. The heat generated is sufficient to melt or burn out the metal in the saw cut but not enough to draw the temper on the sides.

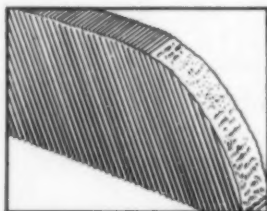
The hardness of either saw or metal to be cut is of little importance. Thin metal sheets are cut like paper, and plates up to one inch in thickness can be cut at speeds of ten inches per minute.

We hope this has proved interesting and useful to you, just as Wrigley's Spearmint Gum is proving useful to millions of people working everywhere for Victory.

You can get complete information about this method from Bell Aircraft Corporation, Buffalo, New York.

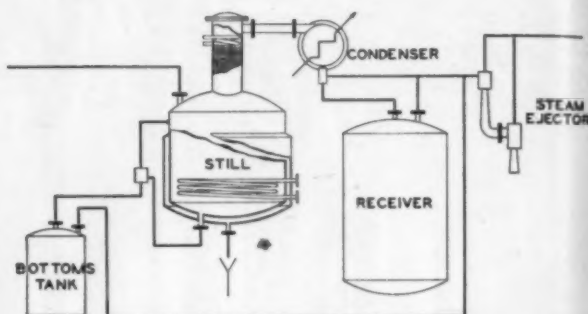


Proof of ability of new method to cut hard materials is demonstrated by operator cutting a file.



The temper of curve cut section shown above is unaffected.

HIGH VACUUM STILL FOR UNSTABLE PRODUCTS



HICKS designed purification stills give superior finish to end products use in the plastic and vegetable oil industries.

S. D. HICKS & SON CO., INC.
BUILDERS OF EQUIPMENT SINCE 1842

SHOPS		PROCESS DIVISION
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Hyde Park, Mass.	E. Boston, Mass.	New York City

NEVILLE

NEVILLAC* NEVINDENE* "G" RESIN "R" RESINS

COUMARONE and MODIFIED COUMARONE RESINS

Although none of our resins are under W.P.B. allocation, because of important large war uses for the above resins prompt deliveries are now only being effected on AA priority ratings.

The following resins, which are dark-colored, are currently available in large quantities for prompt shipment without priorities:

NUBA* PARADENE* 465 RESIN

*REG. U.S. PAT. OFF.

NEUTRAL
WATERPROOF
CHEMICALLY
RESISTANT

Perhaps one of these would be just what you want. Write or wire for information and samples.

THE NEVILLE COMPANY
PITTSBURGH · PA.

Chemicals for the Nation's War Program

BENZOL • TOLUOL • XYLOL • TOLUOL SUBSTITUTES • CRUDE COAL-TAR SOLVENTS
HI-FLASH SOLVENTS • COUMARONE-INDENE RESINS • TERPENE RESINS • TAR PAINTS
RUBBER COMPOUNDING MATERIALS • WIRE ENAMEL THINNERS • DIBUTYL PHTHALATE
RECLAIMING, PLASTICIZING, NEUTRAL, CREOSOTE, AND SHINGLE STAIN OILS

AIR FILTRATION **AAF** DUST CONTROL



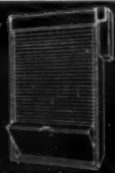
THE SYMBOL of *Clean* AIR

American Air Filter dust control and air filtration equipment is in general use in every field of American manufacture—reducing operating costs, eliminating dust hazards, accelerating production and protecting quality. Many of the phenomenal achievements of precision manufacture developed during the war period have been made possible by AAF dust control. The same is true of the development of many of the synthetic products that have been in the forefront of the news due to diversion of the more strategic materials to direct war use.

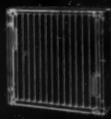
Because AAF research and engineering have kept pace with industrial progress and because AAF dust control equipment has so successfully met the air cleaning requirements of each new advancement in manufacturing technique, the AAF trade mark has become the *Symbol of Clean Air*.

If you have a dust problem, there is an AAF engineer close by who would be glad to discuss it with you without obligation. Send for our latest bulletin, "AAF In Industry".

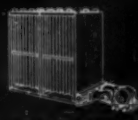
AMERICAN AIR FILTER COMPANY, INC. 326 Central Avenue, Louisville, Ky. In Canada: Darling Bros., Ltd., Montreal, P. Q.



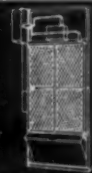
SELF-CLEANING AIR FILTER



AIRMAT DRY FILTER



AIRMAT DUST ARRESTER



ELECTRIC PRECIPITATOR



ROTO-CLONE PRECIPITATOR

CHRISTIE

**Rotary Dryers
Rotary Retorts
Coolers**

EVERY TYPE of Rotary—

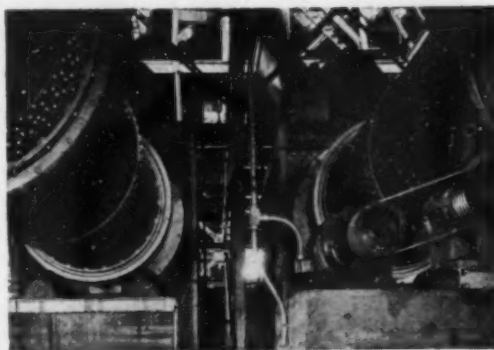
Each possessing the exclusive features that over a quarter of a century specializing on this work assures.

CHRISTIE'S Steam Tube Principle is unique in design

where the temperature must be under absolute control so as to avoid danger of overheating the material.

Consists of a series of steam tubes within the drum upon which the material rests. Moisture being removed without appreciable dust loss.

Write for "Factors to Seek and Check in Buying a Rotary Dryer". Free, instructive, helpful.

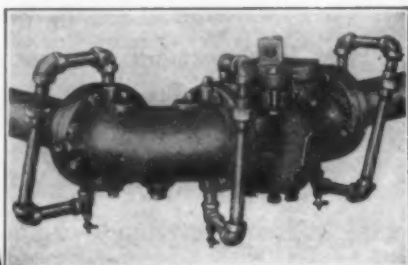


**Dryers
Calciners
and Coolers**

LR. CHRISTIE CO., 17 E. 42nd ST., NEW YORK, N. Y.

Maintain Proper Temperature —Keep Heating Element Out of

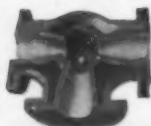
Your
**PROCESS
PIPES** with



JACKETED PIPE and FITTINGS

There are no "cold spots" in H & B Jacketed Pipe Systems. The jackets go to the flanges on both pipe and fittings—preventing heat losses and maintaining proper temperatures. The jump-over pipes (see illustration above) prevent the heating element from entering the process pipe.

Other distinctive features of H & B jacketed systems are drain plugs for any mounting position, and valves of plug cock type, with special provisions for maintaining proper tension—without binding. Write for complete information.



All H & B Fittings are double walled

HETHERINGTON & BERNER INC.
703 Kentucky Ave., Indianapolis, Indiana

Hetherington & Berner



Victory

IS OUR ONLY JOB NOW

—but we're planning for YOUR post-war needs

- Steel plate fabricators
- Manufacturers of Class 1 pressure vessels and all other classes of welding
- Complete X-ray and annealing facilities
- Completely equipped department for field erection

**Plate and Welding Division
GENERAL AMERICAN TRANSPORTATION
CORPORATION**
SHARON, PA.

TOWERS of Strength

. . . towers of strength
on the road to victory

. . . towers of promise
for a triumphant tomorrow

. . . towers of achieve-
ment that point upward like
great fingers of prophecy to a
new era of Petro-Chemicals.

A salute to the men of
the chemical industry whose
research, resourcefulness and
sweat is contributing so much
toward victory and security.

The Durametallic Corpo-
ration is proud to play a part in
this important industry by pro-
viding packings and mechani-
cal seals "Designed For The
Need" in the sealing of proces-
sing equipment.

BUY U. S. WAR BONDS AND STAMPS

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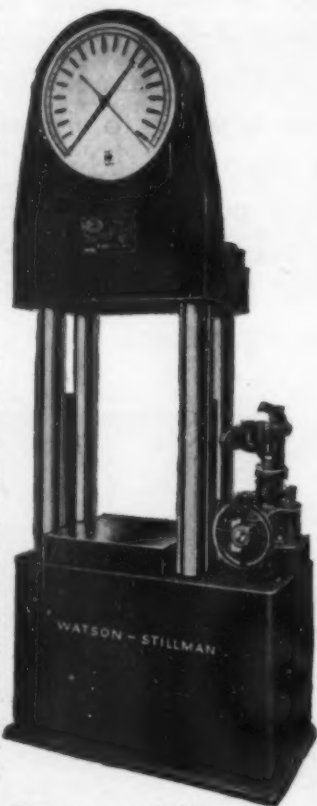
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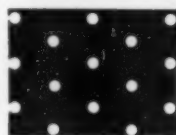
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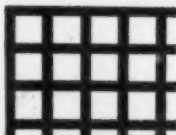
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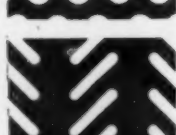
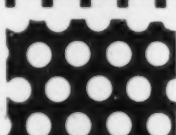
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ALUMINUM OXIDE X 24,600 as seen with the RCA Electron Microscope

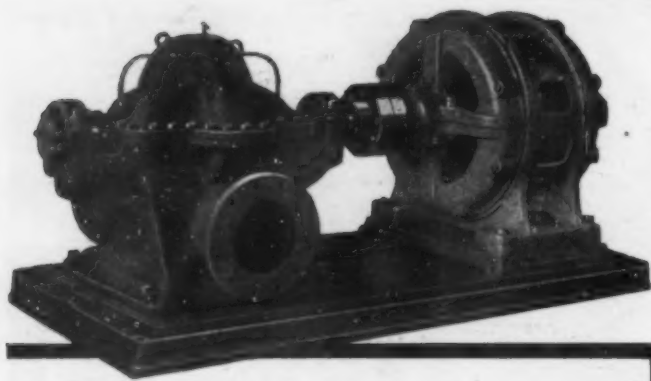
This micrograph shows clearly the interesting leaflike structure of aluminum oxide crystals. The dark narrow streak near the bottom gives an excellently sharp view of the crystal as seen edgewise. When this picture was taken, the research physicists who observed it were surprised to find this unusual and unclassified crystal shape. Further study, however, showed definitely

that these are true crystalline particles. Thus, use of the RCA Electron Microscope is, in many fields, uncovering new knowledge. For information regarding the RCA Electron Microscope and its applications in science and industrial research, please address inquiries to the Electron Microscope Section, Radio Corporation of America, Camden, New Jersey.



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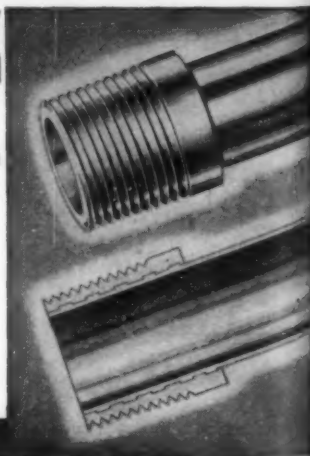
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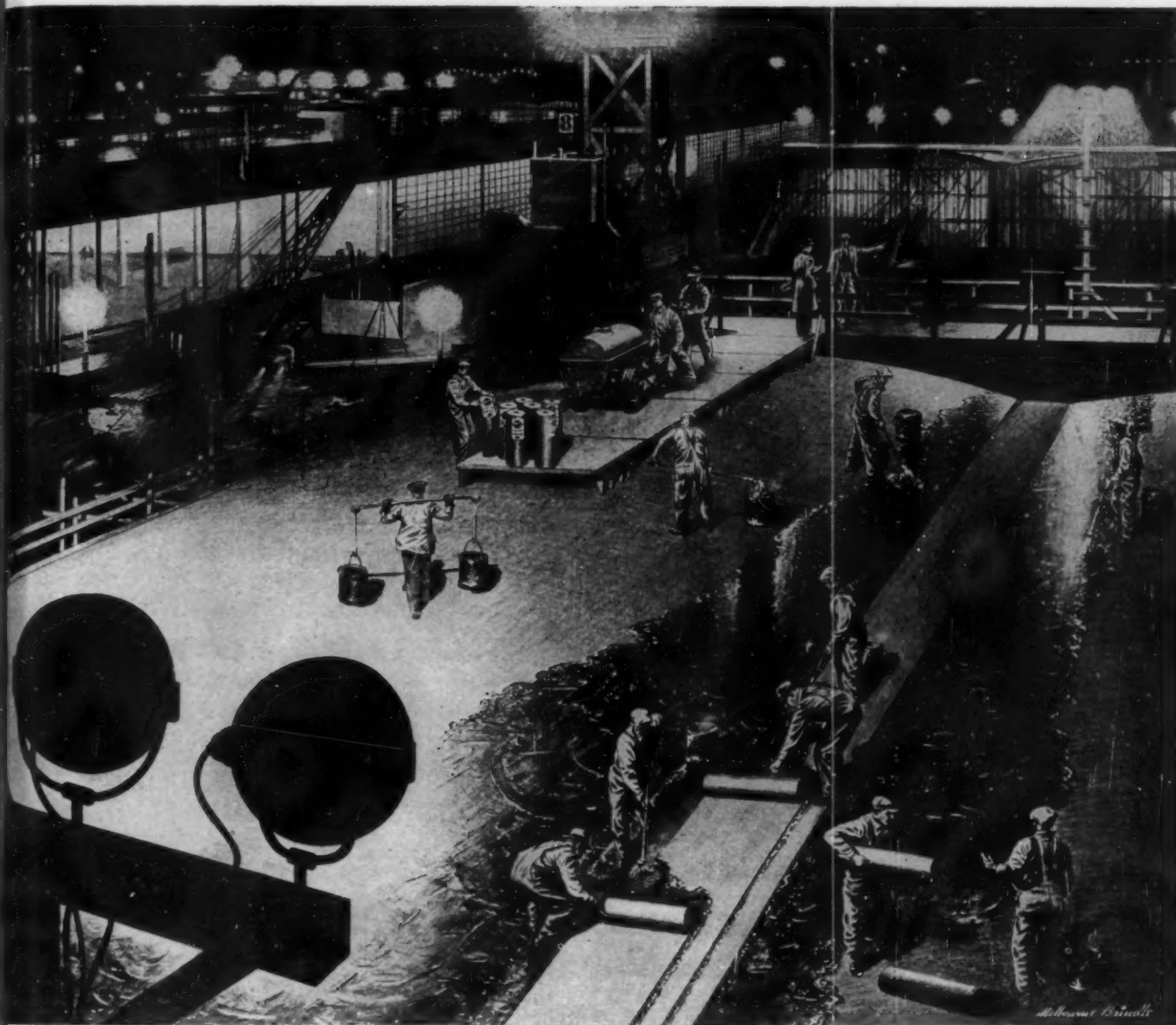


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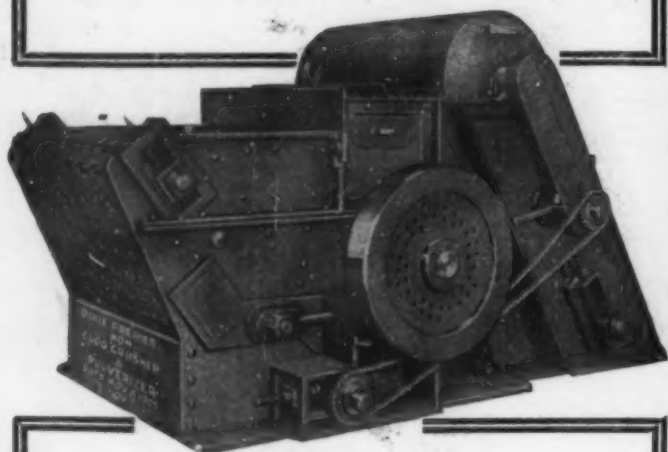
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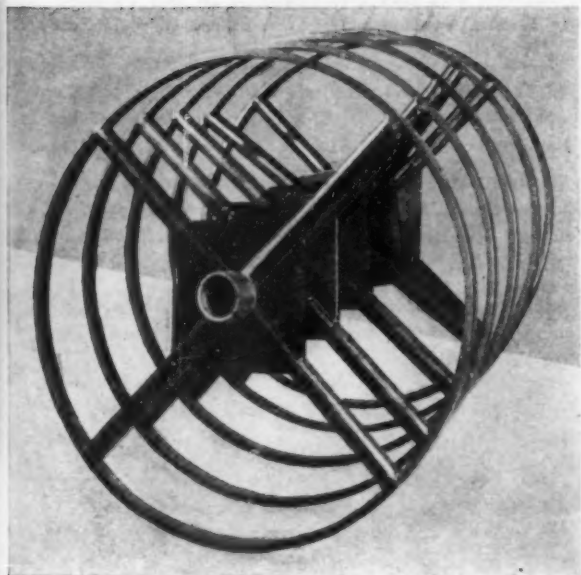
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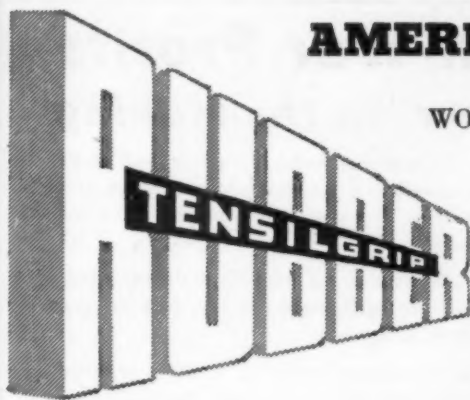
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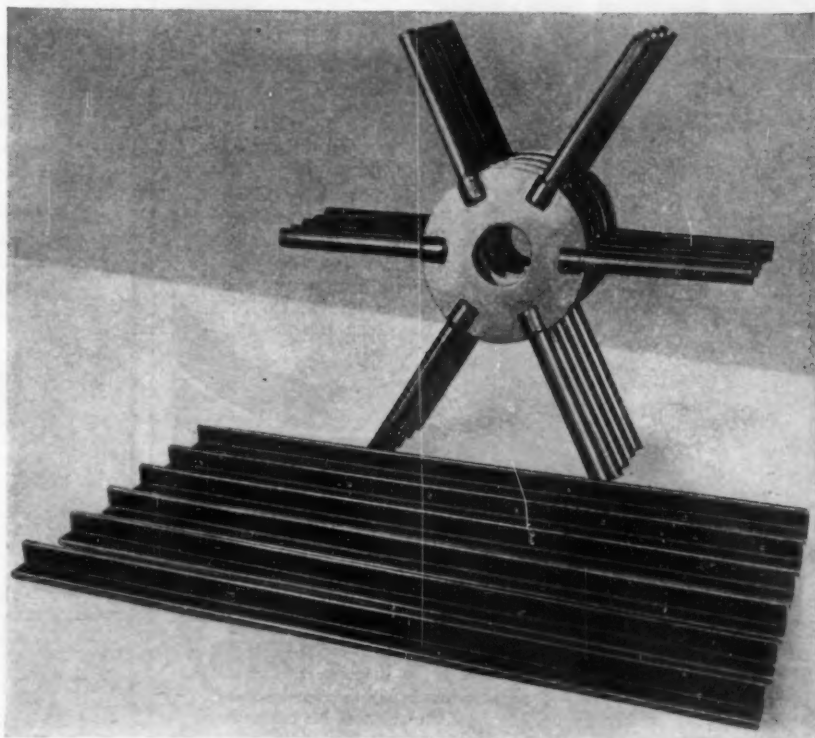
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FISCHER, EMIL JOHANNES: *Laboratoriumsbuch für die organischen plastischen Kunstmassen (Press- und Gussmassen), ihre Roh- und Hilfsstoffe*. Halle (Saale), W. Knapp, 1938. viii, 96p. (Orig. price \$3.35) Price\$3.35

GÖTZE, KURT: *Kunstseide und Zellwolle nach dem Viskose-Verfahren*. Berlin, Springer, 1940. xi, 644p. (Orig. price \$23.80) Price\$20.00

KRAUSE, ERICH: *Die Chemie der metall-organischen Verbindungen*. Berlin, Borntraeger, 1937. xv, 926p. (Orig. price \$23.40) Price\$24.00

LANGENBECK, WOLFGANG: *Die organischen Katalysatoren und ihre Beziehungen zu den Fermenten*. Berlin, Springer, 1935. v, 112p. (Orig. price \$3.00) Price\$3.65

SEITH, WOLFGANG: *Diffusion in Metallen (Platzwechselreaktionen)*. Berlin, Springer, 1939. 151p. (Orig. price \$7.80) Price\$6.45

SIEGEL, AUGUST: *Korrosionen an Eisen und Nicht-eisenmetallen. Betriebserfahrungen in elektrischen Kraftwerken und auf Schiffen*. Berlin, Springer, 1938, v, 86p. (Orig. price \$8.64) Price\$6.35

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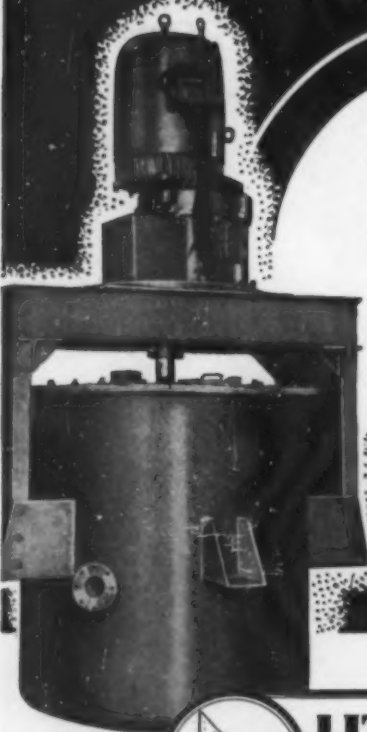
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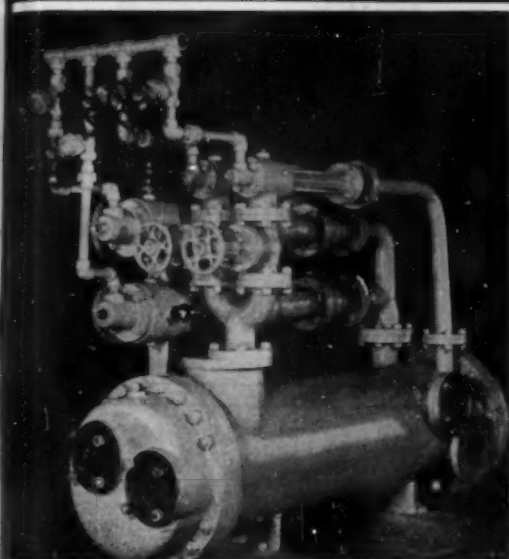
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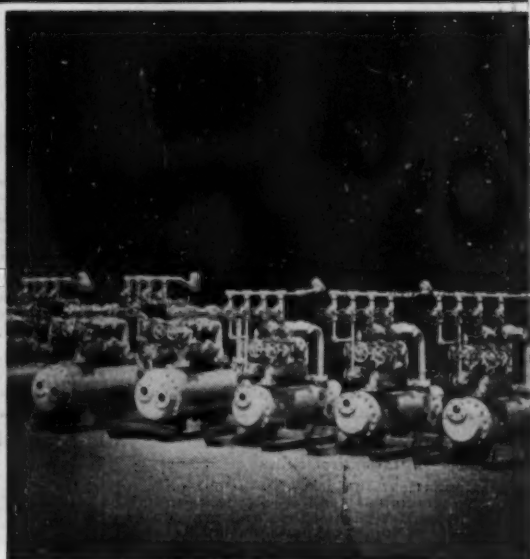
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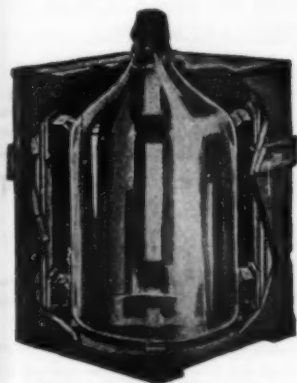


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The solution of any of these problems can logically be found first among other readers of Chemical & Metallurgical Engineering. You can get their attention—at small cost—through an advertisement in the Searchlight Section of Chemical & Metallurgical Engineering.



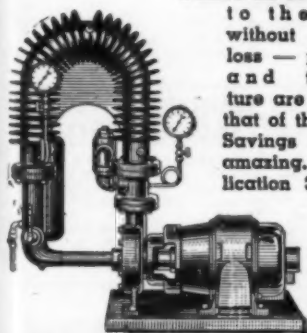
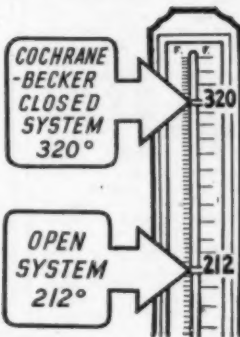
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AMAZING

The Cochrane-Becker High-Pressure System of Condensate Return is a remarkable new system of draining condensate from process equipment and returning it free of entrained air and gases, to the boiler, without flash loss — pressure and temperature are close to that of the steam when leaving the boiler. Savings and increase in production are amazing. Ask for details or write for publication 3025.



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This advanced type, in 12 sizes, is equally adapted for making many similar reductions required in the Process Industries.

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PUT YOUR REDUCTION PROBLEMS UP TO US

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The advertising rate is \$6.00 per inch for all advertising appearing on other than a contract basis. Contract rates quoted on request.

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NEW ADVERTISEMENTS received by 10 A. M. January 4th will appear in the January issue subject to limitations of space available

POSITIONS VACANT

CHEMICAL ENGINEER WANTED: with two or three years experience, preferably in operations, for by-product development work in large kraft pulp and paper mill—location southeast. Persons now engaged in highest skill in essential industry cannot be considered. P-665, Chemical & Metallurgical Engineering, 330 W. 42nd St., New York 18, N. Y.

CHEMICAL AND MECHANICAL ENGINEERS for process design of petroleum plants producing essential war materials. Experience in either oil refinery design or test work preferred, but will consider experience outside of petroleum industry bearing upon fluid flows, heat transfer problems, fractionating tower and furnace design. Good postwar possibilities for continued employment in research and development division of major oil company located on Eastern Seaboard. State age, college, year graduated, degree, by whom employed and salary expected. Enclose small inexpensive photograph. Certificate of availability necessary. P-701, Chemical & Metallurgical Engineering, 520 N. Michigan Ave., Chicago 11, Ill.

ELECTROCHEMICAL ENGINEER or electrochemist for research work on lead-acid storage batteries and products used in their manufacture. Experience in storage battery research desirable but not essential. Prefer man with wide interests, initiative, and desire for work in applied electrochemical research. P-687, Chemical & Metallurgical Engineering, 330 W. 42nd St., New York 18, N. Y.

WANTED—METALLURGIST—Graduate of accredited University and experienced in non-ferrous foundry practices with experience in nickel alloys desirable. Plant located in Milwaukee area now operating in War Production. Position in steady for Post-War. P-703, Chemical & Metallurgical Engineering, 520 N. Michigan Ave., Chicago 11, Ill.

CHEMISTS OR CHEMICAL ENGINEER. Beverage experience very desirable. Food manufacturing also helpful. Good position, good wages. Post-war future excellent. Give age, training and experience. P-704, Chemical & Metallurgical Engineering, 330 W. 42nd St., New York 18, N. Y.

CHEMICAL ENGINEER WANTED: for permanent position. Experience in the manufacture of acetaldehyde and acetic acid from acetylene essential. Submit full personal and professional data and draft status. Certificate of availability required. Will also consider chemical consultant with necessary qualifications on a per diem basis. P-685, Chemical & Metallurgical Engineering, 520 N. Michigan Ave., Chicago 11, Ill.

(For additional Position Vacant ads see page 362)

WANTED

CHEMICAL ENGINEER

A nationally known Rayon Company requires the services of a Chemical Engineer to be located in Virginia. The work is of a diversified nature and involves tests on materials of construction and plant equipment, the writing of reports, and miscellaneous investigations. Those now employed in war industries at their highest skill should not apply. Please submit by letter your educational background and previous experience together with a small photograph to

P-689, Chemical & Metallurgical Engrg.
330 W. 42nd St., New York 18, N. Y.

EMPLOYMENT SERVICE

SALARIED POSITIONS — This advertising service of 34 years' recognized standing negotiates for high salaried supervisory, technical and executive positions. Procedure will be individualized to your personal requirements and will not conflict with Manpower Commission. Retaining fee protected to refund provision. Identity covered and present position protected. Send for details. R. W. Bixby, Inc., 260 Delward Bldg., Buffalo, N. Y.

POSITIONS WANTED

CHEMICAL ENGINEER, B.S. forced to retire from large chemical company on account of age (65), not health, wishes position in charge of small operation where his varied experience in chemical research and production can be actively applied. FW-674, Chemical & Metallurgical Engineering, 330 W. 42nd St., New York 18, N. Y.

CHEMICAL ENGINEER, 7 years experience Pilot plant operation, sales, process, equipment development and design. Desires position with small or medium sized equipment or chemical manufacturer. Married. Certificate of Availability. FW-702, Chemical & Metallurgical Engineering, 520 N. Michigan Ave., Chicago 11, Ill.

MAINTENANCE ENGINEER, 32, Eleven years experience mining, Petroleum and chemical industries, seeks permanent position with post war future. Good managerial experience. Honorable discharge officers reserve. Draft status S-A. FW-699, Chemical & Metallurgical Engineering, 520 N. Michigan Ave., Chicago 11, Ill.

(AVAILABLE)

EXECUTIVE ENGINEER

Graduate Engineer, age 40, with wide range of experience in chemical field wishes to make change. Now employed as chief engineer of large chemical and metallurgical corporation. Broad background of experience in plant layout, design, construction and maintenance, as well as process development and pilot plant work.

PW-697, Chemical & Metallurgical Engineering
520 North Michigan Ave., Chicago 11, Ill.

WANTED!

Evaporator Engineer

Excellent opportunity for Chemical Engineer skilled in design, construction and operation of evaporators. Permanent position with Pennsylvania process equipment manufacturer having international reputation. Write giving full details to

P-688, Chemical & Metallurgical Engineering
330 W. 42nd St., New York 18, N. Y.

WANTED

SKILLED ENGINEERS

Engineers with an eye to the future are needed by a leading soya bean processing plant engaged in vital war work and having a substantial post-war product development program.

Men trained by virtue of education and/or experience are required for building design, mechanical design, material handling and equipment layout.

In answering, give complete information regarding educational background, age, family and draft status, experience and present type of work. Also enclose a recent snapshot if possible.

P-691, Chemical & Metallurgical Engrg.
520 N. Michigan Ave., Chicago 11, Ill.

WANTED

COMPETENT ASSAYER CHEMIST

For work in Bolivia. Capable of assaying tin, silver, copper, tungsten, bismuth, etc., ores and concentrates. Three-year contract. Salary \$4,000 per annum. Spanish an asset, not necessary. Transportation paid.

P-692, Chemical & Metallurgical Engineering
330 W. 42nd Street, New York 18, N. Y.

WANTED

METALLURGIST-MILL FOREMAN

Experienced in laboratory test work and operation flotation gravity circuits, for work tin and tungsten mines Bolivia. Three-year contract. Salary \$4,000 per annum. Spanish an asset, not necessary. Transportation paid.

P-693, Chemical & Metallurgical Engineering
330 West 42nd Street, New York 18, N. Y.

Additional Employment Ads on page 362—Wanted Ads page 361, 362 & 370

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BOX NUMBER W-695

c/o Chemical & Metallurgical Engineering, 330 W. 42nd Street, New York 18, N. Y.



POSITIONS WANTED

(Continued from page 360)

CHEMICAL ENGINEER, (degrees Ch.E. & M.S.), 20 years experience in all phases of precious metals field, assaying, refining (electrolytic & acid), metallurgy, special alloys (jewelry, dentistry, contacts), research and development, management, etc. Now employed but not in war work. Perfect knowledge of Spanish and French. Location immaterial, would consider foreign countries. Age 42, married, three children, draft status 3AH. PW-705, Chemical & Metallurgical Engineering, 330 W. 42nd St., New York 18, N. Y.

CHEMICAL ENGINEER, Ph.D., unusual experience in research, manufacturing and management, numerous patents, specialist water purification, chlorine and caustic manufacture, beyond draft age, seeks appropriate connection. PW-706, Chemical & Metallurgical Engineering, 330 W. 42nd St., New York 18, N. Y.

CHEMICAL ENGINEER having 10 years experience manufacturing dyestuff intermediates and other organic chemicals desires position as Development Engineer with a progressive company that realize the value of good semiplant design and operation. Minimum salary accepted, \$6000. PW-707, Chemical & Metallurgical Engineering, 330 W. 42nd St., New York 18, N. Y.

PLANT ENGINEER—Convincing record of experience relative engineering, plant development, construction, supervision plant maintenance, warehouse, purchasing, etc. and essential personnel. Non-ferrous metallurgical, chemical or allied industries. Draft exempt, resourceful, and aggressive. Now employed. Want change to more responsible duties. PW-696, Chemical & Metallurgical Engineering, 330 W. 42nd St., New York 18, N. Y.

BUSINESS OPPORTUNITIES

CANADIAN CORPORATION operating 4 modern plants capable of producing Machinery and Equipment for any purpose, interested in establishing connections with American Companies for Manufacturing and sales rights in Canada. Please write United Steel Corporation, Ltd., 58 Pelham Avenue, Toronto, Ontario.

FOR SALE

FOR SALE—To Close Estate, Chemicals and Apparatus of research chemists private laboratory. Contact Adamx, 1203 West Cucharas, Colorado Springs, Colo.

FOR SALE—2 KRUPP-MOODAC-75 HP 500 RPM 3 cylinder diesel engines with 'V' belt drives, can be seen in operation. In perfect mechanical condition. Low Price. Black & White Corp., 574 West 130th St., New York 27, N. Y.

FOR SALE—Black & Clawson 28 x 60 double drum dryer with Reeves Speed Reducer. Perfect working condition. FS-686, Chemical & Metallurgical Engineering, 330 W. 42nd St., New York 18, N. Y.

BIRD SOLID BOWL Continuous Filter For Sale. Perfect Condition. FS-708, Chemical & Metallurgical Engineering, 330 W. 42nd St., New York 18, N. Y.

WANTED

PROCESS EQUIPMENT SALES ENGINEER

Chemical Engineer to travel extensively in sale of broad line of chemical processing equipment.

SW-632, Chemical & Metallurgical Engineering
330 West 42nd St., New York City

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New York and Northern New Jersey sales and technical servicing of prospects for equipment used in industrial manufacturing; Chemical and Food processing. Offer wide acquaintance acquired during twenty years active handling of standard and special built machines and equipment. Know manufacturing processes and interested handling lines showing possible savings of production costs or having improved design features. Looking forward to future sales based on sound economics and desire one or two additional commission accounts to whom offer complete facilities; financial responsibility and active handling. Confidential correspondence.

RA-683, Chemical & Metallurgical Engrg.
330 W. 42nd St., New York 18, N. Y.

WANTED

CHEMICAL ENGINEERS and CHEMISTS

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DEVELOPMENT CHEMIST—to do plant control work and qualitative and quantitative analytical work in laboratory on tungsten products and fluorescent powders. Any experience in paint or ceramic industry helpful.

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PAINT CHEMIST—To work on industrial paint problems. Set up paint checks and assist paint department foreman with production problems.

INORGANIC CHEMIST—To work on general inorganic chemical problems arising in development of electronic devices. Should have some training in metallurgy and be familiar with electroplating.

Our plants are located in both Pennsylvania and Massachusetts.

If you feel that SYLVANIA is the kind of a company you would like to work with, won't you give us your age and enough information as to your technical education and experience and salary requirements to warrant an early interview in either our New York, Boston or Salem offices. All replies strictly confidential

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Industrial Relations Department

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RA-694, Chem. & Met. Engrg.
330 West 42nd St.
New York 18, N. Y.

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North of England general engineering firm, employing 250, wish to contact American company desirous of securing manufacturing facilities in Britain. Facilities include grey iron castings from 56 lbs. to 10 tons, welded fabricated platework up to 10 tons, machine shop with heavy lathes, planers and boring machines suitable for chemical engineering plant.

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I. MILLER, INC.
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WE BUY

Surplus Chemicals, Drugs, Waxes, Oils, Gums, Mercury, Nickel, Monel and Inconel.
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Graduate chemical engineer with convincing sales executive and personal sales record in chemical equipment and chemicals, is open for sales executive or sales connection with progressive manufacturer or jobber—with or without investment. Draft exempt, resourceful, and aggressive. Now employed.

SA-698, Chem. & Met. Engineering
330 W. 42nd St., New York 18, N. Y.



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5—6' Bufovak Vacuum CRYSTALIZERS, V-belt drives.

- 1—PROCTOR & SCHWARTZ, 9-Truck Atmospheric Dryer, 40 trays per truck 1562 sq. ft. tray surface.
- 1—NICKEL LINED TRUCK TANK, 1000 gal.
- 6—3-ROLLER MILLS, up to 16x40.
- 9—1000 lb., 200 lb., DRY POWDER MIXERS. Other smaller sizes.
- 2—Creason Morris 48" copper basket, direct m.d. CENTRIFUGALS, ball bearing.
- 1—W & P MIXER size 10, 500 gal., jacketed type VIM Class CC: 7—size 15, 100 gal. Jack., type VI, Class BB; and other sizes.
- 8—KELLY FILTERS, #150, #250, #450.
- 12—OLIVER FILTERS, 4'x6', 6'x6', wood and iron; 8'x8', 8'x12'.
- 8—PEBBLE MILLS: 1—Patterson, 6'x7' Silex Lined; 1—32"x42" rubber lined; other sizes.

DIRECT HEAT ROTARY DRYERS

3—70" x 30' Ruggles Coles Type A-9 Double Shell Direct Heat Rotary Dryers.

- 50—25 gal. Monel open TANKS: 12—45 gal.
- 14—RUBBER LINED Rectangular TANKS: —2650 gal.; 9—500 gal.; 2—200 gal.; 1—150 gal.
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- 3—ROTARY KILNS—4' x 30', 5 x 50', 7 x 120'.
- 4—BELT CONVEYORS, 30" x 110', 14" x 30', 14" x 65', 30" x 425'.
- 2—36 x 24" Type B Jeffrey HAMMER MILLS.
- 1—Draco PNEUMATIC CONVEYOR, 30 T.P.H.

WANTED: Idle Machines
Single Items or Complete Plants.
You can help War Production by sending us your list.

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- 5—RAYMOND PULVERIZERS: 5 Roll High Side; No. 1 Beater Type; No. 0000.
- 2—SWEETLAND #12 FILTERS monel leaves.
- 1—SPERRY 42"x42", CAST IRON FILTER PRESS, plate-frame, 55 chambers; 1—SHRIVER 36"x36", washing, 60 chambers; 20 others, 30"x30" to Laboratory sizes.
- 7—HEAT EXCHANGERS: 50 to 1600 sq. ft. heating surface.
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- 1—Zaremba Triple Effect EVAPORATOR, 500 sq. ft. per effect, complete.
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3—#432 Rotex Sifters, triple deck, size 40"x84", each equipped with V-belt drive, 2 H.P. dust-proof 3/60/220-440 volt motor, starter, structural steel supporting frame. Now at our Newark, N. J. Shops.
Excellent rebuilt condition.

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- 35—CENTRIFUGAL EXTRACTORS, 12" to 72" bronze and steel baskets, belt and motor drives.
- 8—ROTARY DRYERS: 4'x30', 5'x30', 5'x40', 6'x24'.
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- 3—CRUSHING ROLLS—36 x 16" Sturtevant, 40 x 16", Colorado Iron Wks.

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- 5—Steel Jack. Kettles, 100 gal., 900 gal., 2400 gal.
- 7—Steel rect. Tanks, 2700 gal., 3300 gal.
- 1—Mixing Tank, 3000 gal.; 1—1650 gal., coil heated.

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Steel Storage Tanks, Direct Heat Rotary Dryers, Percolator, Pumps, Engines, etc.

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Blowing Engines, Turbo Blower, 25000 C. F. M. at 18 P. S. I. Briquetting Equipment, Draco Pneumatic conveyor for 30 T.p.h with Draco Dust Collector, Drum Hoists, 44 AC Motors, up to 125 HP.

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Every machine in your plant is a used machine

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and all other
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to
SAVE AMERICA**

SPECIAL
2—Pfaudler 500 gal. Closed Jacketed Agitated, Stainless Steel Lined Kettles.

- 1—Raymond #10 Imp. Mill, complete.
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- 1—#2 Oliver 14"x8" Duplex Vac. Pump.
- 1—Pennsylvania Vac. Pump, 14"x8".
- 2—Worthington 12" x 12" x 12" Vac. Pumps.
- 10—Glass Lined & Steel Tanks up to 4000 gals.
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- 1—A.&F. Brown 24" Attrition Mill.
- 6—Raymond & Schutz-O'Neill Mills.
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- 3—Single & Double Roll Crushers.
- 10—Pebble & Jar Mills, Lab. to 200 gals.
- 2—5 Roll water cooled 16"x40" Steel Roller Mills.
- 4—Ross 2 Roll Mills, 12"x30" & 16"x40".
- 5—Day & Ross Pony Mixers, 8, 15, & 40 gals.
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- 35—Pebble Mills, 10 to 300 Gal.
- 30—40 to 500 Gal. Copper Jacketed Kettles.
- 18—Pony Mixers, 8, 15 and 40 gal.
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- Hammer Mills, Ball Mills, Pulverizers.
- 5—Motor driven Star Feeders.
- NEW PORTABLE MIXERS, std. and ex. proof ¼ to 10 HP.
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GUARANTEED!

Rebuilt Equipment



We've got to apologize! We've been trying for weeks now to get this ad ready, but every time we get a list of equipment typed up we go and sell it the next day! We've never been as busy as we are today . . . and we don't like to advertise equipment which we don't have in our own stock ready for immediate sale and delivery. So, even though we know this will all be sold (probably) before the ink is dry on the presses, here is a partial listing of some of our interesting items . . .

*COMPRESSORS

- 11 x 11 York compressor, force feed, vertical, single acting, ammonia, enclosed type Y-16
- 12½ x 12½ York ammonia compressor, same as above, force feed
- 14 x 14 York ammonia compressor, same as above, force feed
- 7½ x 7½ splash feed, York ammonia compressor
- 9 x 9 Frick, splash feed, 40 HP, 60 cycle, ac motor
- 9 x 9 York splash feed, ammonia compressor, 40 HP, 60 cycle, ac motor
- 1—150 ton DeLa Vergne horizontal, force feed, 25 cpi, 220 v. motor

MUSE BE SOLD AT SACRIFICE PRICES!

*AGITATED TANKS

- 10'0" dia. x 14'0", horizontal, belt drive; ready for inspection
- 10' dia. x 12'0" overall, top drive to geared head motor
- 9' dia. x 9' overall, bottom drive with bevel and pinion gear
- 9'0" dia. x 7' high with 4' cone, bottom drive, 10 HP motor
- 8'6" dia. x 7'0", top drive with 7½ HP motor; ready to ship
- 8' dia. x 8' overall, top drive with 10 HP motor; excellent shape

Write, wire or phone for complete specifications and descriptions; many others ready for immediate inspection and shipment.

WE MUST MOVE THESE TANKS IMMEDIATELY!

*KETTLES

- 5 Brand new Dopp kettles, never been used; 40 gal. to 80 gal.
- 1 500 gal. stainless, agitated kettle, like new
- 6 copper jacketed kettles from 55 gal up; ready to ship
- many others; write for list!

*TANKS

- 1—2100, 7'6" x 9' Pfaudler glass lined
- 4—1050 gal. 8'6" dia. by 10' Pfaudler glass lined
- 8—8400 gal steel, 10' dia. x 10'8"; riveted
- 2—300 gal. 6' dia. x 44" high Pfaudler

*ICE PLANTS

- 1 freezing tank 800-300 lb cans
- 1 freezing tank 300-400 lb cans; the cans in both are in rows of 17 and electric crane lifts all at one time; in perfect condition, do not leak; ask for complete description.

tell us your requirements!

2 WAYS BY WHICH YOU CAN HELP UNCLE SAM . . .
 Buy more U. S. War Savings bonds every week . . . there is no better investment; and your money is needed in order to "Back the Attack!"
 Turn your idle and surplus equipment in to a reputable dealer so that it can be rebuilt and put back to work; help someone who can't buy new equipment!

Charles S. JACOBOWITZ Company
 3080 MAIN STREET BUFFALO 14 N. Y. PHONE AMherst 2100
Serving American Industry for over 25 Years

FOR SALE

- 300 gal. Stainless Steel Tank, 54x31, jkt., agit.
- 300 gal. Nickel Tank, 36"x30"x36", Insul.
- 70 gal. Copper Still, 26"x30", coil.
- 25 gal. Copper jkt. Kettle, 22x18, agit.
- 60 gal. Pfaudler Tank, jkt., rev. coil.
- 4—100 gal. Pfaudler Tanks, jkt., agit.
- 1000 gal. for Pfaudler tank, jkt. agit.
- 60 gal. Pfaudler Evap. Dish, 42x16.
- 1½ bbl. Dough Mixer, 3 H.P.
- 80 qt. Hebert Mixer, 2 H.P.
- 100 lb. Day Sifter and Mixer.
- 60 to 400 gal. Homogenizers or Viscosizers.
- 12 ft. Multiple Tube Heat Exchanger, 8 p.h. with 32—1" White Metal Tubes.
- 4 ft. and 7 ft. Copper Vacuum Pans.
- 5 x 12 Buffalo Vacuum Dryer.
- ¾ Northern rot. pump, 3 H.P., 300 lbs. press.

What Have You For Sale?

Send Us Your Inquiries?

LESTER KEHOE MACHINERY CORP.

1 East 42nd Street, New York 17, N. Y.
 Murray Hill 2-4616

FOR SALE

- 1—48" Vulcan copper Fractionating column.
- 2—4x6" Atmospheric Drum Dryers.
- 1—6" Centrifugal Pump and 75 hp. motor.
- 2—4x10" and 6x15" Tube Mills.
- 1—600 sq. ft. all-copper Condenser.
- 1—24" Attrition Mill with 20 hp. motors.
- 2—12x22" and 16x40" 3-roll Mills.
- 4—Lead Lined Tanks, 400-1000 gallons.
- 1—100 sq. ft. single effect Evaporator.
- 10—Variable speed Drives ½-5 h.p.
- 1—2x5" double drum Flaking Roll.
- 2—3x6" and 4x5" Lard Rolls.
- 2—Colloid Mills requiring 40 h.p. each.
- 1—26x24" Link Belt type A 2-roll Crusher.
- 1—No. 2 Austin gyratory Crusher.

What equipment have you for sale?
LOEB EQUIPMENT SUPPLY CO.

908 N. Marshall Ave., Chicago 22, Ill.

FIRST FLASH!

LIQUIDATION

Fort Washington Chem. Co.

- 1—STEEL JKT. ACID STILL: 5' dia. x 10'3" deep—with 24" cone bottom
- 1—GLASS LINED VAC. STILL: 55" dia. x 23½" overall
- 2—STEEL JKT. & AGTD. VAC. PANS: 5' dia. x 5'3" deep
- 1—PAUL O. ABBE, 12—1 gal. PEBBLE MILL
- 2—4' x 12' ROTARY ATMOSPHERIC DRUM DRYERS: with Steam Trunion
- 1—RICHARDSON HOPPER SCALE
- 2—BALL MILLS: 6'6" x 13' L.
- 4—LEAD MELTING POTS
- 2—GRUENDLER HAMMERMILLS: No. 4 & 6
- 3—IRON ACID PUMPS
- 1—SHRIVER, 24" IRON FILTER PRESS
- 1—RAYMOND, 00, PULVERIZER: with complete classifier
- 1—HYDRAULIC PRESS: down ram, 62" x 62"

Keep up to date on **GOOD REBUILT EQUIPMENT** with **F. M. C.!**

FIRST MACHINERY CORP. F M C 9th St. & East River Drive
 NEW YORK CITY

BRILL LIQUIDATION VALUES

DRYERS

- 1—Bufflovak Double Drum Atmospheric Drum Dryer, each drum 32" dia. x 90" long, complete with speed reducer, motor and accessories. EXCELLENT CONDITION.
- 1—Bufflovak Vacuum Shelf, with 12—42" x 42" shelves
- 1—Devine No. 23 Vacuum Shelf, with 13—59" x 78" shelves
- 1—Bufflovak Rotary Vacuum, 3' x 10', with steel drum
- 1—Bufflovak Vacuum Drum, 24" x 20", with steel drum
- 2—Scott Rotary Vacuum, 4' x 8', jacketed
- 1—Devine Type Rotary Vacuum, 30" x 11'
- 1—Vulcan 6' x 42', 1/2" steel shell
- 4—Ruggles Cole Rotary, 4' x 21' to 6' x 64"
- 1—Christie 7'5" x 75', 5/8" shell
- 1—Ruggles Cole 7 1/2' x 60', 1/2" shell
- 1—Devine Steam Tube, 4'3" x 19'8", with steam jacket
- 4—Hershey Hot Air, 5' x 25', to 6' x 30'
- 2—Bufflovak Atmospheric Crystallizers, 6' dia., with drive and motor

MIXERS

- 1—W. & P. Size 15, 100 gal. Jacketed, Vacuum
- 2—W. & P. 9 and 50 gal.
- 1—Day No. 30 Imperial, jacketed, 75 gal.
- 2—Ross Double Arm, 25 and 75 gal.
- 2—Scott Jacketed, 4' x 5' x 8'
- 4—Ross, Read Double Arm, 20 to 150 gal.
- 5—Day, Ross Change Can Pony, 2 1/2 to 40 gal.
- 8—Day, Robinson Powder, 100 to 1500 lb.
- 6—Vertical Paste and Semi-Paste, 50 to 100 gal.

KETTLES—PANS—STILLS

- 1—Battery of 2 Bufflovak 6' dia. Atmospheric Crystallizers, with speed reducer
- 2—Bufflovak, Devine Kettles, steel, jacketed, closed, 60" x 48", 42" x 60"
- 2—Steel Kettles, 6' dia. x 5' deep, 1/2" plate, with coils and jacket
- 1—Durriron Kettle, jacketed, 100 gal.
- 8—Steel Kettles, jacketed, agitated 500 gal.
- 2—Day Kettles, jacketed, agitated, 500 gal.
- 1—Lead Lined Kettle, agitated, 275 gal., with lead condenser and piping
- 10—Copper Kettles, steam jacketed, 25 to 600 gal.
- 1—Cast Iron Kettle, closed, jacketed, agitated, 30 gal.
- 1—Oats Vacuum Pan, copper, 30" dia.
- 4—Vacuum Pans, cast iron, coil, 10' to 14' dia.
- 1—Copper Still, atmospheric, 6' dia., with condenser
- 1—Pfaudler Vacuum Pan, glass lined, without jacket, 125 gal.
- 1—Buffalo Still, jacketed, 600 gal.

PULVERIZERS—GRINDERS

- 3—Allis Chalmers Crushing Rolls, 36" x 15", 28" x 15"
- 1—Robinson Attrition Mill, 30", motor driven with 2—40 HP motors
- 3—Jeffrey Hammer Mills, Type "A", 36" x 24", 42" x 24"
- 12—Patterson, Abbe, Thropp Pebble Mills, porcelain and silix lined, Lab. to 650 gal.

Just Purchased

For

IMMEDIATE LIQUIDATION

JUDGE CONCENTRATOR

(Near Salt Lake City, Utah)

Main items consisting of—
 Marcy Ball Mills; Allis-Chalmers Crushing Rolls; Jaw Crushers; Dorr Thickeners; Classifiers; Screens; Oliver and American Filters; Erie City 150 HP Scotch Marine Boiler; Sterling 125 HP Boiler; Motors, 5 to 100 HP; Tanks, etc.

Send for descriptive circular. Everything priced attractively for quick disposal. Representative on premises.

PULASKI UMBER CO.

Pulaski, Pa.

(approx. 30 miles from Pittsburgh)

Main items consisting of—
 Raymond 4 Roll High Side Roller Mill, complete with piping, fan, dust collectors and 40 HP motors and drive; 3 Bbl. and Bag Packers; Bucket Elevators; Stone Crusher; Rotary Dryer 3' x 14'; Motors; etc.

Land and building are also for sale. Machinery can be purchased apart from property. However, this is an excellent opportunity for anyone who wishes to do fine grinding for immediate operation to purchase land, building and equipment. Full details on request.

PULVERIZERS—GRINDERS

Continued

- 5—Rubber Lined Pebble Mills, 36" x 36", 24" x 36"
- 1—Patterson Type "D" Continuous Porcelain Lined Mill, 2'6" x 3'6", with Patterson motor drive and motor driven feeder. PRACTICALLY NEW.
- 6—Hardinge Conical Mills, 2'8" to 8' x 36"
- 6—Smidth, Patterson Tube Mills, 2 1/2' x 10' to 6'6" x 21'6"
- 2—Jaw Crushers 9" x 15", 10" x 20"
- 1—Raymond No. 0000 Impact Mill, ball bearing, with 15 HP motor
- 6—Raymond Impact Mills, Nos. 0000 to 3
- 6—Ross, Day, Lehman 3 Roll, water cooled Mills, 9" x 24", 12" x 30", 16" x 40"

FILTERS

- 1—Shriver 30" x 30", cast iron, recessed, 30 chambers, with Shriver 45 gpm Diaphragm Pump
- 3—32" x 32" Cast Iron, plate and frame, 45 chambers
- 3—Filter Press Skeletons 30" x 30", 36" x 36"
- 4—Sweetland Filters, Nos. 7, 10, 11, 12
- 5—Oliver Rotary Continuous, 3' x 6", 3' x 2", 5' x 6", 5' x 8", 8' x 8"
- 2—Vallez No. 4 with 40 leaves

CENTRIFUGALS

- 3—Tolhurst 40" suspended type, solid bronze baskets, bottom discharge, driven by 15 HP vertical motors
- 1—Tolhurst 40", suspended type, solid steel basket, bottom discharge, driven by 10 HP vertical motor
- 1—Battery of 2—American Tool 40", suspended type, perforated copper baskets, bottom discharge, with framework
- 5—Tolhurst 48", 40", 32", self-balancing type, perforated copper and steel baskets
- 1—Tolhurst 32", suspended type, solid steel basket, bottom discharge, belt driven
- 3—Troy, American 20" to 30", steel and copper baskets, belt driven
- 3—Sharples No. 6 Super Centrifuges, clarifier and separator types, motor driven

MISCELLANEOUS

- 5—Devine, Buffalo, Nash, Vacuum Pumps
- 22—Centrifugal and Rotary Pumps, 1" to 8", belt and motor driven
- 30—Steel Storage Tanks, from 2500 to 46,000 gal.
- 10—Wood Tanks, 500 to 700 gal.
- 3—Absorber Tanks, steel, lead lined, 1700 gal., for pressure or vacuum
- 5—Glass Lined Tanks, from 50 to 300 gal.
- 7—Heat Exchangers, 180 to 700 sq. ft.
- 6—Tyler Hummer, Rotex Screens
- 5—Tablet Machines, from 1/2" to 1 1/4" die.
- 14—Powder, Liquid, Paste Filling Machines, semi-automatic and automatic
- 6—Labelling and Wrapping Machines, semi-automatic and automatic
- 7—Bucket Elevators, 10' to 50' centers

This is a partial list only. Send for latest bulletins.

BRILL Equipment Co.

183 VARICK STREET, NEW YORK CITY



SPECIAL EQUIPMENT

IN STOCK . . . READY
FOR IMMEDIATE DELIVERY!

ALL OFFERING SUBJECT
PRIOR SALE!

WIRE COLLECT FOR PRICES
& DETAILS

- 1—Pneumatic Scale Co., Stainless Steel, 20 spout. Fully Automatic, Vacuum Straight Line Liquid Filler, speed 100 bottles per minute.
- U. S. Bottlers 10 spout Model C-10 Filling Machine 4 to 16 oz. capacity.
- 48" Copper Vacuum Pan, Steam Jacketed equipped with heavy duty underneath driven agitator.

MILLS

- 2—Day 3-roll Roller Mills 16 x 40 horizontal type with roller bearings, direct motor drive.
- 2—Kent 16 x 40 3-roll Roller Mills horizontal type, direct motor drive.
- 1—Kent 9 x 24 3-roll Roller Mill horizontal type, direct motor drive.
- 1—National 3-roll Roller Mill with steel water chilled rollers, 16 x 40.
- 1—National 3-roll Roller Mill equipped with 16 x 40 water cooled chilled steel rollers.
- 1—Lehman 16 x 40 3-roll Roller Mill with water cooled rollers.
- Paul O. Abbe 4 ft. x 3 1/2 ft. Pebble Mill, 180-gallon capacity, Buhr Stone Lining.

MIXERS

- W. & P. 2500-Gal. Double Arm Steam Jacketed Mixers.
- 2—900 gal. Steam Jacketed Mixing Tanks.

WE PAY CASH FOR SINGLE
MACHINES OR ENTIRE PLANTS

EVERY MACHINE BUILT TO
UNION'S STANDARD OF
PERFECTION



UNION
STANDARD
EQUIPMENT CO.

318-22 LAFAYETTE STREET
NEW YORK, N. Y.

Steel Alcohol Distilling Unit

Capacity continuous feeding 1/2 ethyl alcohol and 1/2 steam vapor at 400 gph. producing 95% alcohol concentrate.

Steel Dehydrating Still

44 in. dia. x 11 ft. high hydrator with 6 heating trays, etc.

R. C. STANHOPE, INC.
60 East 42nd St. New York, N. Y.

RECONDITIONED CONVEYORS and other items

- 1—28' Whitney chain bottle conveyor, complete with 1/2 HP, 3-phase motor and 90 degree corner bracket.
- 1—Belt conveyor 24" wide by 100' long double-deck MD.
- 1—Bar-type 45 degree MD case booster, 13' elevation.
- 1—Gravity conveyor, 2000', 12", 14", 16", 20", 24" and 28".
- 1—Chain case conveyor 80' with three 90 degree curves MD.
- 1—20 tube 12' Wright insulated and porcelain jacketed internal tube cooler, 14—1 1/2" nickel tubes on water, 6—1 1/2" stainless steel tubes on ammonia, plus extra 4 tube stainless steel ammonia section.
- 1—40' long brand new double-deck 12" wide sanitary food tray conveyor, MD photo on request.
- 1—#2 Viking 2" all iron, 2 HP, MD positive pump.
- 1—Meyer 24 spout beer filler.
- 1—250 gal. Manton Goulin MD homogenizer.
- 1—1000 lb. Fairbanks overhead dial scale and stand.
- 5—12" wide slide-belt MD belt conveyor tables.
- 1—25' conveyor 8" wide Meyer brass slat chain, MD.

STYL-O-MATIC STRAIGHTLINE UNSCRAMBLING TABLES

One right hand and one left hand,, with revised double V-belt discharge. Immediate delivery.

This is an opportunity to obtain one of the famous Styl-O-Matics at a reduced price.

Approx. 800' 12" "Alvey-Ferguson Co." slider-belt intermediate conveyor, with ten drives, take-ups and stands. All in excellent condition.

MANY OTHER CONVEYOR ITEMS

Above equipment attractively priced for quick disposal to make room for expanded new conveyor manufacturing facilities.

ISLAND EQUIPMENT CORP. Conveyor Experts

101 Park Ave.

New York 17, N. Y.

SPECIALS IN KETTLES

- 50 Gal. Copper Jacketed, Closed
- 400 Gallon Copper Jacketed & Agitated
- 600 Gallon Copper Jacketed & Agitated
- 601 Gallon Copper Jacketed—No ag.
- 50 and 60 Gal. Alum. & Monel Jacketed
- 100 Gal. Nickel Jacketed
- 150 Gal. Jacketed, Lead Lined, Agitated
- 500 Gal. Closed, Jacketed, Glass Lined
- 2—50 Gallon, Closed, Jacketed, Glass Lined
- 7—60 Gallon, Steel, Jacketed—7/16" plate
- 500 Gal. Closed, Jack. & Ag. Patterson, Steel
- 1800 Gal. Bethlehem "Frederking" Cast Iron
- 2—Devine C.I. 200 Gallon, Agitated
- Valley Iron 350 Gal. Closed, C.I. & Agitated

Ask for Bulletin "M"
for other listings

MACHINERY & EQUIPMENT CORPORATION (of N. Y.)

59 East 4th St. New York 3, N. Y.

IDLE Equipment Is WASTED Equipment

... and just as great a loss as it would be if insufficient power slowed up vital machinery scheduled for capacity war production.

Have you idle equipment that you no longer need? Possibly, it can be taken out of the "waste" classification and put to work—NOW—in some plant, somewhere, in urgent need for it.

Let used equipment dealers or advertising in the Searchlight Section help you "channel" your IDLE equipment to the war production front.

PLASTIC, RUBBER, CHEMICAL, HYDRAULIC and PROCESS EQUIPMENT

Specialists in Rubber, Plastic, Chemical, Hydraulic and Process machinery. Whatever your needs, check with us. Rebuilt equipment from stock.

UNITED RUBBER MACHINERY EX.

320 Frellinghuysen Av.

Phone: Bigelow 3-4732

Newark, N. J.

EQUIPMENT FOR SALE NOW

MIXERS

- 3-Day Powder Mixers, 100#, 200#, 500#.
- 2-W & P "Uni-Dor" Vacuum Mixers, 75-gals. each.
- 1-W & P Bronze Mixer, 30-gals.
- 10-Double-Arm Mixers, Wheeler, Day, & W. & P. 15-gals. to 50-gals.
- 2-Day Mixers, 4'x2'x1/2"; 4'x4'x1/2".
- 2-Plastic Kneaders, 4'x7'x12".
- 1-Patterson Unipower Agitator.
- 2-W & P Jacketed Mixers, Size 24, Type X. Class BSC.

TANKS & KETTLES

- 1-RECTIFYING UNIT, 48" Fractioning Column, 48" Rectifying Tower—plates, 54" Packed Tower.
- 1-Steel Bubble Tower, 4'x3'3/4", 3" plate.
- 1-Steel Stay-Bolted Tank, 8000-gals., Jacketed.
- 1-Copper Jacketed Kettle, 37500-gals.
- 1-Evedur Jacketed Kettle, Evedur Agitator, 2000-gals.
- 2-Dopp Kettles, 80-gals. to 300-gals.
- 25-Jacketed Kettles, 5-gals. to 150-gals.
- 3-Wood & Steel Lead-Lined Tanks, 600-gals. to 1000-gals.
- 2-Cast Iron Acid Eggs, 4' I.D. x 8'6" long, 2 1/4" thick.
- 2-Steel Autoclaves, Agitators, 1000-gals., each.
- 1-Steel Jacketed Digester, 2000-gals.
- 1-Steel Hopper, 12' square, 22' high overall.
- 1-Laboratory Autoclave, Jacketed, 2 1/2-qts.
- 6-Jacketed Kettles with Agitators, 6' ID x 7'5" high.
- 1-Cast Iron Jacketed Glass-Lined Kettle, Agitated, 250-gals.
- 1-Unjacketed Enamel-Lined Kettle, Agitated, 100-gals.

DRYERS

- 1-Louisville Rotary Steam Tube Dryer, 6'x50'.
- 1-Rotary Crystal Dryer, 5'x26'.
- 2-Ruggles-Coles Rotary Direct-Heat Dryers, 54"x20'.
- 1-Rotary Vacuum Dryer, 3'x10'.
- 3-Degreasing Ovens, 7 1/2'x6'15" x 8'x15'.
- 1-Huhn Rotary Dryer, 35" dia. drum head, 84-1" steel tubes, approx. 9' long.

PULVERIZERS

- 1-Raymond #1 Impact Pulverizer.
- 2-Houston #2 Extruders.
- 2-Rotary Cutters, Ball & Abbe, #1, #2.
- 6-Schultz-O'Neill Pulverizers, 16", 20", belt driven.



1-Bartlett & Snow Style S, Direct Heat Parallel Flow Rotary Dryer, 102" dia. x 50' long. Cylinder is constructed of 1/2" steel boiler plate, and is brick lined. Cylinder is carried on two steel riding rings. Each riding ring is carried on two cast steel trunnion rolls. Cylinder is driven by a cast steel girl gear.

Equipped with a Sturtevant Silent Vane Fan, #90, Design #4, complete with base, but less motor.

Send for the "Gelb News Record"

FILTER PRESSES

- 2-FEINC Wooden Continuous Filters, 8'8"x6': 4'x10'4".
- 1-Sweetland Filter Press, #7.
- 1-Johnson Jacketed Filter Press, 18x18".
- 2-Shriver Filter Presses, 30x30", recessed type, 50 plates.
- 1-Johnson Recessed, Open Delivery Filter Press, 18x18", 10 Plates.
- 3-INFILCO Stainless Steel & Monel Disc Filters, #5, #1, #30.

MILLS

- 2-Smith Iron-Lined Tube Mills, 4'x12".
- 1-Hardinge Conical Ball Mill, 3' dia. x 3' cyl. length.
- 2-Abbe Continuous Tube Mills, 4 1/2'x15'.
- 1-Hendy Continuous Ball Mill, 3'x12".
- 7-Three-Roller Mills, all sizes and makes.
- 1-Five-Roller Mill National, water-cooled, 20x40", 16x40".
- 5-ANCO Continuous Soap Powder Mill, cylinder, 9'x3'.
- 1-Hurrell Homogenizer, Size 14, 30 HP Motor.
- 3-Charlotte #850 Colloid Mills, 20 HP Motors.
- 2-Premier 5" Liquid Colloid Mills.
- 2-Pebble Mills, lined & unlined, Abbe, West Pulverizing, 4 1/2'x4'; 5x4'; 3x3 1/2'.
- 3-Watson Mills, Speed Reducers, 2000#, 4000# capacities.

MISCELLANEOUS

- 1-Waldron Triple Color Printing Machine.
- 1-Ames 40 KW Steam Driven Generating Set, side crank.
- 2-Absorption Ceramic Towers, 36" x 24'.
- 1-Stearns #2 Magnetic Separator.
- 1-Terry Back Pressure Turbine, 250 KW Generator.
- 5-Sharples Pressurite Super Centrifuges.
- 1-Tolhurst Extractor, 40" Steel Basket, Bottom Outlet, Suspended Type, 15 HP Motor.
- 2-King & Gerber 60" Rubber-Lined Basket Extractors.
- 1-Stainless Steel Combination Washer & Extractor, 3 1/2'x18".
- 1-Kenyon-Francis Steel Jacketed Sterilizer, 5'x10'.
- 1-Pneumatic Weigher & Packer, 50# bags.
- 1-Allis-Chalmers 2-Roll Crusher, 10"x24".
- Number of Bronze Rotary Pumps; Lead Centrifugal Pumps, Vacuum Pumps, Storage Tanks, Boilers, Air Compressors, etc.

R. GELB & SONS, Inc. UNION, NEW JERSEY
Unionville 2-4900

FOR SALE

- 3-Pneumatic Scale Straight Line Duplex Labelers
- 1-Shriver Cast Iron Filter Press, 36 x 36, 39 Frames, 38 Plates, 684 sq. ft., Washing Type
- 11-Steel Storage Tanks, Welded and Sectional, 1150-11,470 Gals.
- 10-New Wood Cypress Closed Pressure Tanks, 19,220-22,530 gals. each
- 4-Steel Tanks, Glass-Lined, 10' dia. x 10' long, 4-30" sections, 5580 gals. each
- 1-Frederking Cast Iron Evaporator, 5'3" ID x 10'9" Overall (Coils Cast in Shell)
- 1-Stainless Steel Still Column, 20" ID x 12' High (3 Sections)
- 2-Crossley Cast Iron Filter Presses, 24 x 24, 60 recessed plates each unit (480 sq. ft.)
- 1-Vertical Boiler, O & S, 30" dia. x 7' high, 12 HP, 100# Pressure.
- 1-Alco Cast Iron Condenser, 3 1/2" OD x 4'8" Overall, has 73 1/2" #16 BWG 18-8 Stainless Steel Tubes (48 2/3 sq. ft. Heating Surface)
- 3-Attrition Mills, Robinson & Sprout Waldron, each with 2 Motors—10 & 15 HP Units
- 1-York Twin 30 Ton Compressor, 11 x 13, with Steam Engine
- 6-New Stainless Steel Tanks, 60-1000 Gals. Capacity
- 300'-New 12" wide Steel Roller Bearing Conveyor
- 4-Ermold & World Semi-Automatic Labelers
- Also Mixers, Grain Scales, Mills, Still, Columns.

Write For Latest Stock List

PERRY EQUIPMENT & SUPPLY CO.

1515 W. Thompson St., Philadelphia 21, Pa.

Hardinge Pebble Mills 6' x 22"—8' x 30"
Hardinge Ball Mills 6' x 22"—8' x 22"
36-in. Sturtevant Air Classifier
#1 1/2 and #2 Sturtevant Rotary Crusher
Jaw Crushers 6 x 12—8 x 15—10 x 16—24 x 36

Dry Pans 5, 9, and 10'
Exhausters, Blowers, Air Compressors
2-G.E. Pressure Blowers, 3500 CFM—1 1/4 lbs.

1-American 10,000 CFM—18 oz.
Steel Tanks—many sizes
Diesel Engines 75—100—175 HP.
Rotary Kilns—30" x 40'
12" dia—8 Hearths—Herschhoff Furnace
18" dia 4 Hearths—Wedge Furnace
1500 ft—42" 8 ply rubber covered Conveyor Belt—Little used other sizes

LAWLER COMPANY

Metuchen, N. J.

FIRST-FLASH! PLASTIC-RUBBER

THROPP 36" RUBBER MILLS
with motor drive

THROPP 42" RUBBER MILL

ROYLE No. 1 TUBER, motor drive

ROYLE No. 3 TUBER motor driven

ROYLE No. 4 TUBER motor driven

WATSON - STILLMAN STEAM HEATED PLATEN PRESS

3 HYDRAULIC PRESSES 17" Ram, 6 1/2" stroke, with pumps

1 GIULOTINE HYDRAULIC CUTTER

Try Us on "Hard to Get" Equipment!

FIRST MACHINERY CORP.

F M C

9th ST. & EAST RIVER DRIVE, NEW YORK CITY

TANKS

30—25,000 to 30,000 barrel oil storage tanks located at Findlay, Ohio. Will dismantle, match-mark and load. For further information phone, wire or write
PLANT AND EQUIPMENT PURCHASING CO.
1300 Fountain Square Bld., Cincinnati, Ohio

ROTARY DRYER or KILN

5 Foot Diameter
40 Foot Long
1/2" Shell

COMPLETE WITH
Drum Rails—Ring Gear
and Carriages

**EMSCO EQUIPMENT
COMPANY**

EMIL A. SCHROTH, Owner

39 HYATT AVE., NEWARK 5, N. J.

Phone Mitchell 2-3536

FOR SALE

FOR SALE

- 4-Werner & Pfleiderer Mixers 100 gal. cap.
- 5-Pebble Mills 40 to 500 gal.
- 10-Pony Mixers 8, 15 and 40 gal.

SPECIALIZING IN REBUILT MACHINERY

IRVING BARCAN CO.

30 CHURCH STREET, NEW YORK, N. Y.

STEEL DERRICKS
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 Boom, 25 Ton 100 Ft. Boom, 75 Ton 135 Ft.

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 REVOLVING: 5x12, 5x16, 3 1/2 x 18, 3x24, 4x16,
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 60x42, 84x65, 36x10, 9x36,
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 7 Gasoline 15, 40, 60 & 100 H.P.
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361 and 362

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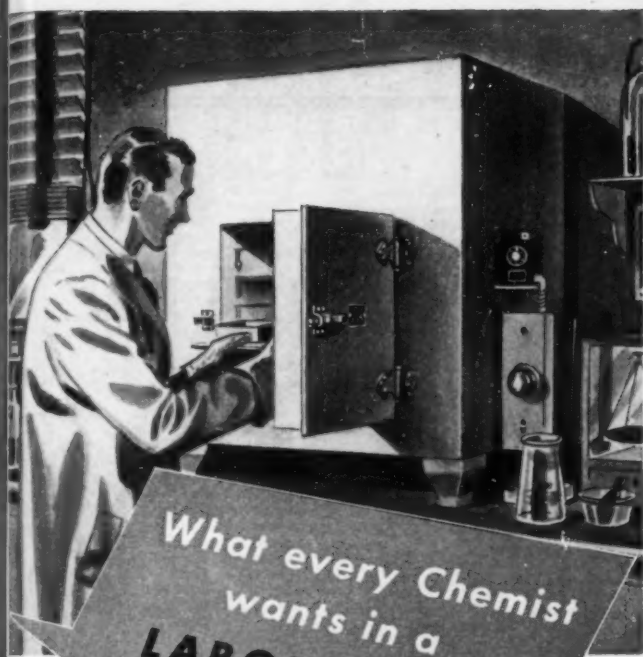
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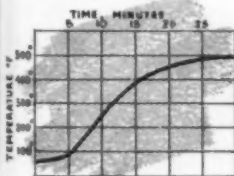
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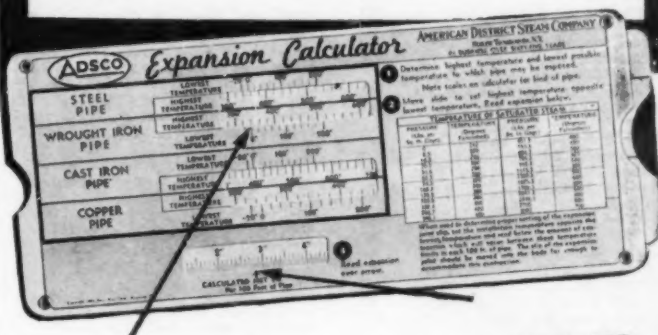
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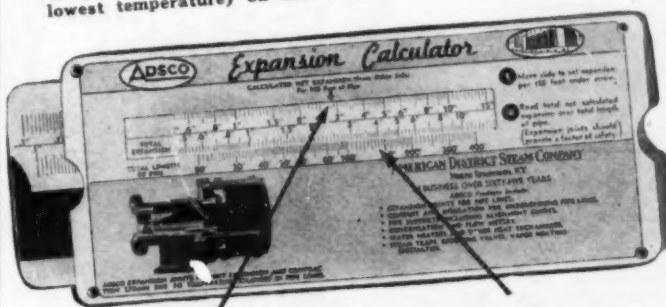


SET 3.40° OPP. 0°

Temperatures corresponding to 100 lbs. is a little less than 340° (340° = 103.3 lbs.) Set 340° (the highest temperature) on the slide opposite 0° (the lowest temperature) on the body.

READ 2.85" OPP. ARROW

Slot at bottom, opposite arrow reads 2.85 per 100 feet of pipe.



SET 2.85" OPP. ARROW

Turn calculator over. Set 2.85" (the expansion per 100 feet) on the slide opposite the arrow. Column marked "Total Expansion" reads 4" for 140 feet.

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It's **FREE** mail the coupon

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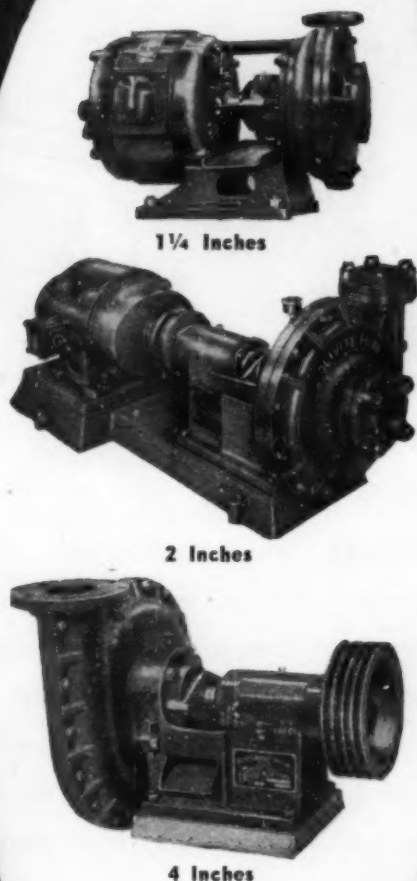
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P

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1 1/4 inches

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Oakland 1, Calif.
2900 Glascock Street

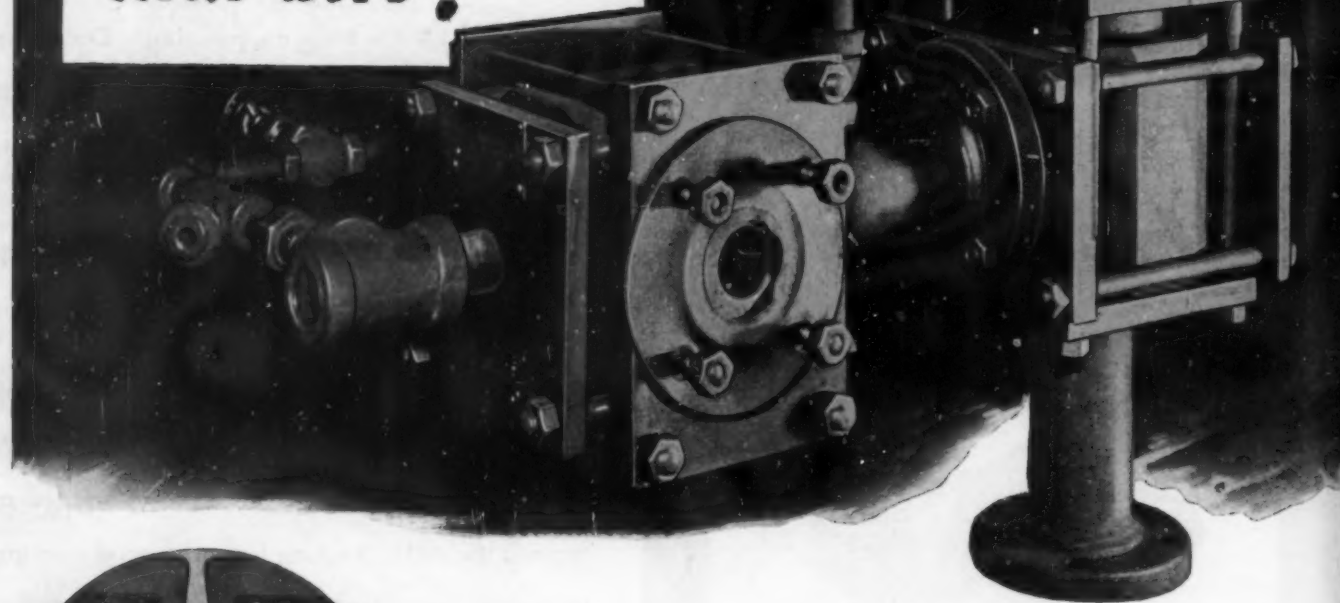
San Francisco 11, Calif.



Chicago 1, Illinois
221 N. LaSalle Street

Factories: Oakland, Calif. — Hazleton, Pa. — Orillia, Ont., Canada — Melbourne, Australia

VACUUM
*-with vapors
 that bite!*



ELLIOTT
Steam Jet
EJECTORS

can meet practically any process need for low absolute pressures in small or large capacity. Write for the bulletin.

EXTREMELY CORROSIVE VAPORS such as hydrochloric, or hot sulphuric acid, are being successfully handled by Elliott ejectors in which the nozzle, nozzle-plate and diffuser are machined to exact dimensions from solid pieces of special treated graphite. This material is quite resistant to the corrosion of most acid and salt solutions, at the same time holding steam flow erosion to minimum proportions. These special ejectors are made only in single-stage and noncondensing two-stage types. (The two-stage unit is illustrated above.)

When you need to pull vacuum under any conditions, even those which rule out usual corrosion-resisting materials, use the experienced cooperation of Elliott engineers.



A star has been added to the Army-Navy "E" flag flown by both the Jeannette and the Ridgway plants of Elliott Company.

ELLIOTT *Company*

HEAT TRANSFER DEPARTMENT, JEANNETTE, PA.

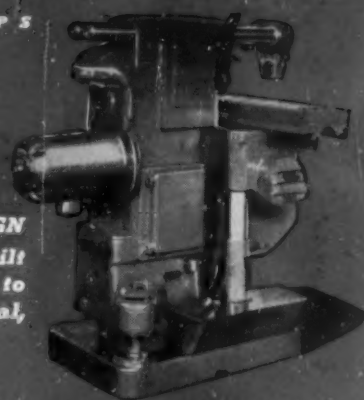
DISTRICT OFFICES IN PRINCIPAL CITIES

• DECEMBER 1943 • CHEMICAL & METALLURGICAL ENGINEERING

BUY UNITED STATES WAR BONDS AND STAMPS

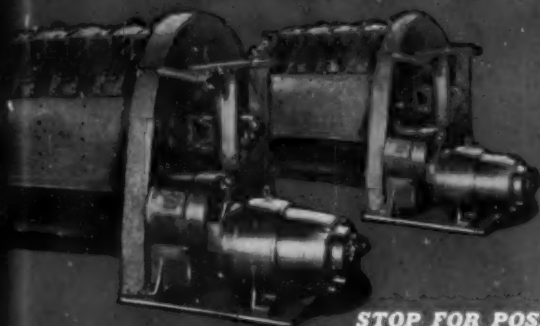
SIMPLE COMPACT DESIGN

The electric brake is built into the motor end cover to form a compact, economical, easy to use unit.



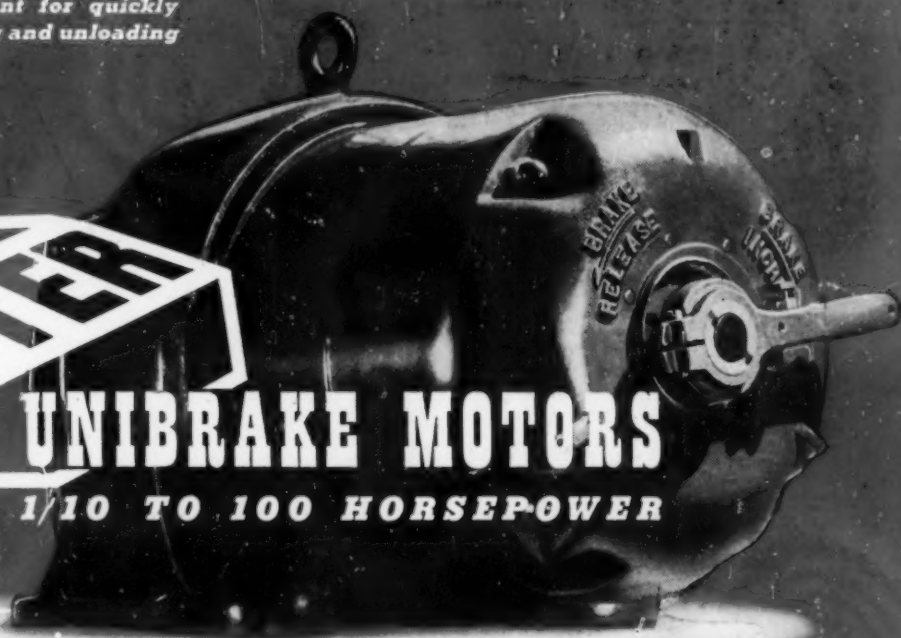
STOP FOR POSITION

Stop at the desired point for quickly and conveniently loading and unloading



UNIBRAKE MOTORS

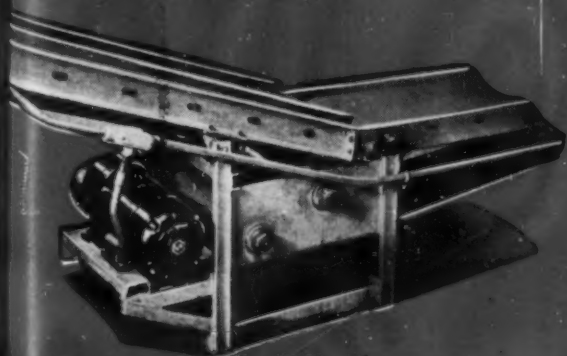
1/10 TO 100 HORSEPOWER



THE MASTER ELECTRIC COMPANY • DAYTON 1, OHIO

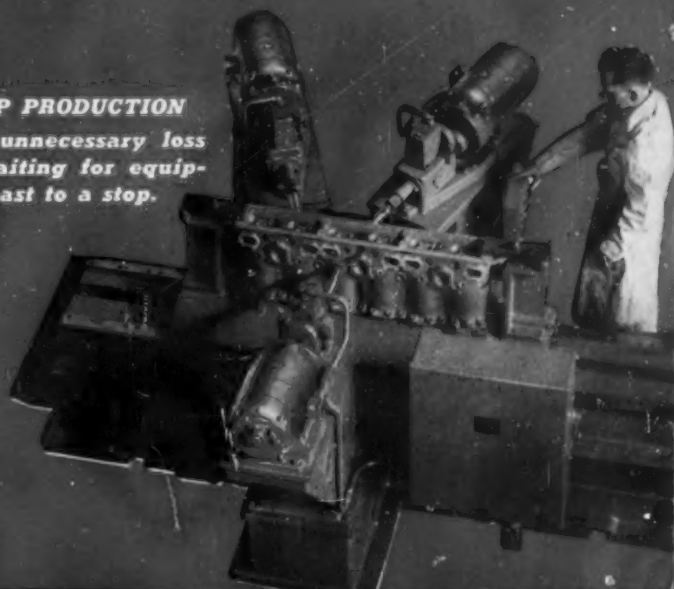
SPEED UP PRODUCTION

Eliminate unnecessary loss of time waiting for equipment to coast to a stop.



STOP AND HOLD ANY LOAD

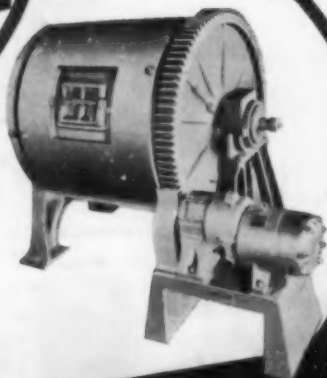
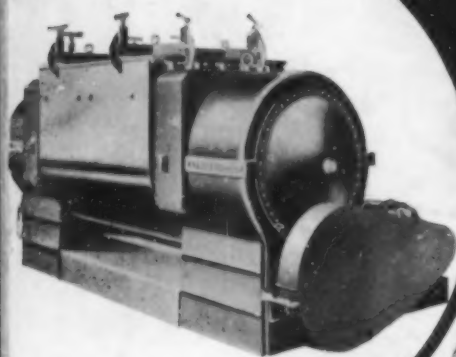
Unibrake motors are very advantageous on hoists, elevators, inclined conveyors, etc....



For your Post-war Plant

NOW { **PLANNING**
PRIMARY ENGINEERING
CONTRACTING
EQUIPMENT INSTALLATION
COMPLETION
(TO THE LAST DETAIL)

194*



THE PATTERSON FOUNDRY & MACHINE CO.
EAST LIVERPOOL, OHIO, U.S.A.

Richard L. Conway
President

